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WITH THE WILLOW PTARMIGAN

By GRACE A. HILL

WITH FOUR PHOTOS

THE EGGS of the Willow Ptarmigan (*Lagopus lagopus*) in the vicinity of Nome hatch about the first of July. On the fifth of July, 1915, my father, James F. Hill, and I made a trip "mushing" over the tundra north of Nome to where Boulder Creek joins the Synuk. At this time we saw several broods of the downy yellow-and-brown fledglings of these Ptarmigan.

When we came upon the first brood the mother feigned a broken wing and the young hid in the tundra grass. My father caught one of the little balls of down which posed patiently in his hands while I took several photographs of it.

Shortly afterwards, as we approached a small clump of willows, we saw a female Ptarmigan struggling in the grass as though from a mortal wound. I had never seen a bird in more evident distress and could not at first believe that she was feigning. But when I came near, she ran a few feet dragging her right wing. I then turned to look for the young, the little grove presenting a likely hiding place.

Although the day was overcast, there seemed to be sufficient light to enable one to distinguish every detail in the carpet of dead leaves beneath the willows. Yet I had not taken two steps, watching carefully, when a young Ptarmigan scurried literally from under my foot-fall. Startled, I watched intently as I took another step; and again one of the birds just escaped being trod upon. Evidently I was standing in the midst of the Ptarmigan's brood, but could not distinguish a bird until it moved. My attention focused upon a spot a few feet from me. Gradually the outline of a fluffy, unblinking birdling became pricked upon my vision. His camouflage against the brown and mottled background of faded leaves and twigs was perfect.

I cast my eye about to find the rest of the brood. Having no success I glanced back to the spot of my discovery. The bird was gone. I gave the laurels to Nature and quietly crept from the field of action.

Five weeks later we again visited Boulder Creek. We were told by two miners who had spent the summer on the creek, that the Willow Ptarmigan had congregated in the creek-bed until there were, they estimated, over four hundred Ptarmigan in the vicinity of their camp. These men told us how the female birds with the more than half grown young trailed up and down the stream look-

Fig. 29. Willow Ptarmigan and brood on the ninth of August, 1915, near Nome, Alaska.

Fig. 30. Flock of Ptarmigan making a dignified retreat before the camera. The protective coloration of the birds at this season and in this environment is almost perfect. Six birds are to be found in this picture.

ing for food, and paid little attention to the mining operations which went on all day within a few feet of their course.

Being instructed as to a likely spot for a picture I opened my camera and sat down. I had not long to wait. A low talking, as of a domestic hen and her chickens, told me of the advancing brood. When they came in sight the talking ceased and the mother bird who led the procession gave some slight indication of uneasiness, but they moved on leisurely. The flock consisted of the female

Fig. 31. THE WILLOW PTARMIGAN IN WINTER IS AN IMPORTANT SOURCE OF FOOD FOR THE ESKIMOS.

and five young. At this season the birds were almost an exact counterpart of the stream bed.

When I arose and approached for a nearer picture, the birds paused a moment, as though to contemplate, and then decided to cross the little stream. This each did with a short easy flight, and the brood proceeded up the incline on the opposite side without the least display of undignified haste. I pressed in my pursuit and got a picture just as they disappeared under a clump of willows.

They did not manifest any more, if as much, fear as biddy with her chicks might have shown.

In the autumn when the birds begin to molt they frequent more the open tundra than the stream beds. The color of the tundra at this time is perfect for the protection of the birds. The first white feathers of the Willow Ptarmigan

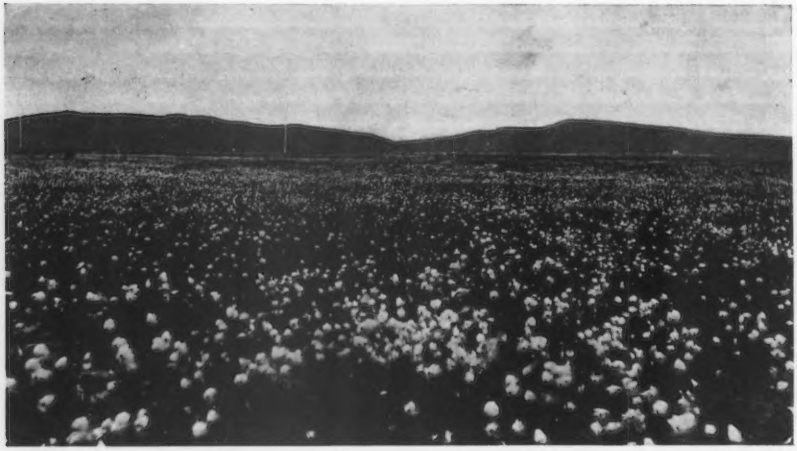

Fig. 32. TUNDRA BACK OF NOME, ALASKA, THE LAST OF AUGUST. THE WHITE COTTON-GRASS AIDS IN THE PROTECTIVE COLORATION OF THE FALL MOLT OF THE WILLOW PTARMIGAN.

appear about the head. At this season the tawny, tundra grass (*Eriophorum polystachyum*) is bearing its white, cottony plumes. So, while it is still warm and sunny, and there is yet no hint of snow, the Willow Ptarmigan may begin to change his coat in perfect safety.

Pullman, Washington, April 22, 1922.

FURTHER OBSERVATIONS ON THE ACTIVITIES OF THE CALIFORNIA WOODPECKER

By WILLIAM E. RITTER

DURING the year that has passed since my former communication (Condor, XXIII, 1921, pp. 3-14) to the Cooper Club on the food habits of California's widely known woodpecker (*Melanerpes formicivorus bairdi*) quite a number of new facts have come to light concerning the economics and general ways of the bird. Some of these have come from other workers and some from my own efforts. The facts and conclusions by others have reached me partly through publications and partly through private correspondence; and I gladly take this opportunity for testifying to the scientific usefulness and personal satisfaction there is in such helpful response as my published communication brought.

I may as well mention right here the publications and the correspondence that have furnished facts and ideas upon which I now draw. Three articles in THE CONDOR for July-August, 1921, contain items later to be referred to. These are: "The Storage of Acorns by the California Woodpecker", by Henry W. Henshaw; "The Storage of Almonds by the California Woodpecker", by Claude Gignoux; and "On the Acorn-storing Habit of Certain Woodpeckers", by Morton E. Peck. Then an important paper, which should have been cited in my previous paper, is: "Food of the Woodpeckers of the United States", by F. E. L. Beal (Biological Survey, U. S. Dept. Agric. Bulletin no. 37, May 24, 1911). The correspondents whose letters contain information that will be utilized, are Mr. John McB. Robertson of Buena Park, California, and Mr. A. B. Howell, Pasadena, California.

My own observations made since the former communication pertain to the same region, that of which Cuyamaca Mountain is the center, and which is the locus of this entire series of studies. Short visits were made to the locality on August 27-28, and November 19-20, 1921. And seven days were spent in camp among the woodpeckers, at Cuyamaca Lake, September 28 to October 6, 1921. As this period was timed for the acorn harvest by the birds, it yielded some of the freshest, most interesting observations it has yet been my privilege to make.

Before passing to the subject matter proper, it is desirable, I think, to be a trifle more specific than I was on my former appearance before the Club, as to the wherefore of these studies. Abiding and lively as is my general interest in bird life, and, for that matter, in all out-of-door natural history, I fear I should not have given as much time and effort to these woodpeckers as I have but for my belief that doing so would bring light upon a question that has loomed large in my mind of late years.

In my earlier paper I went no farther toward stating this question than to remark that it concerns the efficiency of instinctive activity, and so belongs to the vast and vital province of adaptation. Concerning such activities I asked, "How near to perfection is their adaptation?" The further formulation of the question which it now seems best to make, may as well start from the specific statement of it.

The very idea itself, of adaptation, implies, you notice, degrees. To adapt

means to fit as a shoe to a foot or a key to a lock. But, so far as one can see, no such idea and word to express it, would ever have arisen if everything fitted *absolutely*. If we are to have any real idea of adaptiveness or fitness, we *must* apply the good, better, best criterion to it. Otherwise expressed, the idea of fitness is *composed of these degrees*.

Now so obvious is this, once one thinks over the matter a little, that it is surprising to find how frequently thought and expression ignore partly or wholly this gradation in its excellence, even when speaking of adaptation. The ignoring is particularly apt to occur in theoretic discussions of evolution and natural selection. One hears repeatedly that an individual or species is adapted, or is not adapted, and consequently survives or does not survive. The idea of being more or less well adapted, and hence of surviving more or less well, comes far less definitely into thought than into the actual processes of nature. This discrepancy in our conceptions is largely due no doubt to the great difficulty of getting exact quantitative information in any given instance as to how much departure there is from perfect adaptation; as to how much falling short of complete survival there is; and as to the rate at which improvement is made. And the difficulty of getting such information is clearly due in large part to the exceeding complexity of evolutionary phenomena and the slowness with which, generally speaking, they go on.

Try to imagine, even in an approximately statistical way, the main changes involved in the evolution of such a relatively simple thing as the pelican's scoop-net, and see where you come out. Notice that you have only some hypothet-*qualitative* data, to say nothing about exact *quantitative* data, even to make a start with. But suppose yourself satisfactorily started, from, say, a slightly developed gular pouch like that of the cormorant: What next? What exactly *measured* structures and functions between the slightly developed cormorant stage and the highly developed pelican stage is there in your imaginary statistics?

We must come to the main point of this little preliminary.

I take it for granted that no naturalist, especially no field ornithologist, doubts for a moment that the activities of animals are quite as subject to the principle of adaptation as are any of their structures. This being granted what I want to say in a nutshell is that the problem of adaptation in animal activities, particularly in animals of median rank, as for example in many insects, many birds, and many mammals, is, I believe, amenable at certain points to much more satisfactory attack by scientific research than it is in connection with animal structures. This is so because many activities adapt themselves much more quickly and widely than do the vast majority of structures.

A familiar case will make the meaning clear. Take the enormous variety of activities of which the human hand is capable. Think of the difference both as to the action itself and as to the results, between the hand work of a skilled pianist and a skilled watch repairer! Yet the structural difference in the hands in the two cases is very slight, relatively.

But would any one question that great numbers of hand activities are as truly adaptive as were the structural changes involved in the production of the hand originally? And almost any organ of almost any animal shows something of this lack of close coincidence between structural and functional adaptation. Indeed, so much more responsive to changed conditions, so much more pliable, so

much *more* adaptive, are animals by way of their activities than by way of the organs which perform the activities that one is led to conjecture some deeper relation between structure, activity and adaptation, than our rather easy-going evolutional philosophy usually recognizes.

But woodpeckers and not philosophy is our subject now. It is hoped, however, that these remarks will light up somewhat the background of further observations on the particular way in which these birds solve their problem of existence and the degree of success they achieve.

I will present the new observations under three captions. (1) Those which necessitate some modification of conclusions suggested by my former communication. (2) Those which confirm and extend previous conclusions. (3) Those which bring grist that is entirely new to the scientific mill, so far as these studies are concerned.

(1) My previous surmise that the birds are more interested in the grubs contained in the acorns than in the acorn meats has not been substantiated. What I could make out while in camp among them, by watching them gather and eat their breakfasts, was to the effect that good, uninhabited acorns were chiefly used. Again and again birds were seen to pick nuts from the top-most branches of the black oak, fly with them in their beaks to some approximately horizontal surface of a large limb on a pine or another oak, make the surface aid them somehow (I never could see exactly how, as the "breakfast tables" were, of course, all on the upper surfaces of the limbs, and too high for my vision) in breaking and tearing open the nuts. Apparently cracks and chinks in the table top serve as holders for the acorns while they are being opened and eaten. This is indicated by the fact that dead and partly decayed trees or parts of trees were mostly used. I saw no indication of the feet being used in handling the nuts.

The litter on the ground under the dining trees, consisting of shell fragments and lost bits of meat, indicated grubless nuts almost entirely. This result as to the use of mast is in agreement with Beal's examination of the stomach contents of our woodpecker; with which, as previously mentioned, I was not acquainted when my former paper was written.

But these observations should not be taken to prove that acorn grubs are never eaten. They undoubtedly are to a large extent. How far the one kind of food or the other or both are used and under what circumstances, is the only question. And, be it noted, the question is one upon which field data enough for statistical treatment could undoubtedly be gathered were one to set about it seriously.

Another of my earlier surmises not confirmed when the opportunity came to watch the birds at work, was that the stored acorns were mostly picked up from the ground. In no instance did I see nuts thus gathered, while I did see great numbers taken from the trees. But here again this by no means proves that gathering from the ground never occurs. The indications of such gathering given in my former paper still stand and the possibility of both being used accords with the general ability the birds have of accomplishing the same ends by different means.

In my previous report I stated that I had never seen living oaks used as store houses. This no longer holds. Some of the large Live Oaks in the vicinity of Oakzanita on the road from Descanso to Cuyamaca are largely thus used. The significant point in this is that where no pines (or cedars, for these are used to

some extent on Cuyamaca Mountain) occur, but oaks abound, the oaks are utilized. And the utilization of this oak, with its hard, rough-surfaced bark, when no relatively soft, smooth-surfaced pine bark is available, illustrates again a considerable measure of adaptableness in the birds.

(2) The conclusions previously reached that have been confirmed and extended by the later observations are fortunately more numerous and, I think, more important than those that have needed modification. The point which may be mentioned first concerns the extent of the hole drilling. Summing up on the point in my former paper I said: "While the holes are made expressly for the reception of acorns, many holes are probably made which are never used . . . and large numbers of perfectly serviceable holes seem to be abandoned even in localities where both birds and acorns are abundant, and new holes are being made." My later observations substantiate these statements as fully as to leave scarcely a trace of doubt. And Henshaw reaches the same conclusion.

To detail fully my own new evidence would require more time than could justifiably be devoted to it. I will consequently merely describe briefly two perfectly illustrative even though somewhat extreme instances.

In the group of storage trees adjacent to Cuyamaca Lake, which has been the center of my observations since 1918-19, are three pines, which, though as closely be-punctured with holes as any of the others, and though well-stored in previous harvests, received not an acorn during the harvest in 1921; and this in spite of the fact that these trees, especially one of them, were surrounded by oaks well laden with the same acorns which the birds were gathering and storing in other near-by storage trees.

Here were previously-made, good holes a-plenty, acorns a-plenty, and seemingly, woodpeckers a-plenty. But not a single hole received an acorn. So far as I could see, and I watched rather closely, the birds took not the slightest notice of these particular trees. And this might appear the more incomprehensible in that the discarded trees were more secluded from campers and other people than were five other trees that were being well stored.

In contrast with this the following: Some two or three miles from the lake stands an old dead pine nearly all of the branches and bark of which have fallen off. My August visit to this found its smooth, solid surface punctured with a very large number of holes so fresh that almost certainly they had been made during the present summer. Not only were there no acorns at all in these holes, but, looking carefully as I could on the oaks round about, I failed to find a single tree that was bearing more than a mere scattering of nuts. The acorn crop in this particular locality was almost nothing this year.

Taking the evidence at its face value, this is what we have in such a case: In one locality many hundreds, thousands probably, of perfectly good holes in trees standing right in the midst of an abundant acorn crop, yet not one of these holes used. In another near-by locality scores, probably hundreds, of new holes drilled in a tree having no acorn laden oaks round about it, so, for much better reasons, not one of these holes used either.

So much out of the plenty that might be given as evidence that the adaptiveness of hole-drilling by these woodpeckers falls a long way short of perfection.

Concerning the storing itself, my previous report reads: "While this is of distinct service to the food necessities of the woodpeckers, the instinct sometimes

goes wrong to the extent of storing pebbles instead of acorns, thus defeating entirely the purpose of the instinct."

On this point I have no observations of my own. But two more undoubted cases are reported by other persons. One of these is by Mr. A. B. Howell of Pasadena, California; the other by Mr. Henshaw in the article mentioned above. Besides the four definitely known cases of this blunder now on record, several others have been reported to me, but not with sufficient positiveness to warrant regarding them as evidence. It seems, consequently, that it is a maladaptation that is not so very rare.

In connection with the case observed by Henshaw the author makes a comment so interesting that it deserves quoting almost in full. We read:

> This apparently nonsensical departure from the acorn storing habit is by no means entirely devoid of significance, and forms an interesting example of a useful habit gone wrong. . . . California is remarkably well supplied with oaks, and the valleys, foothills, and mountains each have their own species. Nevertheless, not every year is an acorn year, and some seasons the supply of mast is very small indeed, or altogether wanting. It chanced that there was a very poor crop that year about Los Alamos, and, acorns being for the most part wanting, the birds took the readiest substitute. The storage habit, developed through thousands of years, has now become imperative, and, as the birds have to store something in the holes already suggestively prepared, they take the most convenient substitute, quite oblivious of the fact that the stones have no food value nor, indeed, any value whatever to the storer, except that arising from the pleasure of storing them. . . .

To say all that aches to be said with these remarks by Henshaw as a starter would require some long chapters in a large book. Indeed a book having as title "The Natural History of Intelligence" has occupied nearly all my writing time for a year and bids fair to consume another year. This book might be characterized as rotating upon an axis around the chief matters touched in the remarks.

Obviously, then, discussion here of the points raised is out of the question. All I wish to do with reference to the subject is to make sure of not passing it by and thus giving the impression of being unconscious of its importance; and to call attention to one difficulty presented by Henshaw's very plausible, and, I believe, largely correct, explanation of the abortive performance by the woodpeckers.

He assumes, you notice, that the pebbles are accepted as a substitute for acorns, their uselessness not being perceived at the time of storing. Now the question naturally arises as to why the birds should not discover the uselessness of the stones at the time of gathering them. Perhaps Henshaw's idea is that the mistake is never discovered; but he is not explicit on this point. Surely, however, the discovery would be made some time, for instance when, the next winter, the stored acorns or starvation should be the only alternatives before the birds. And that such a narrowing of alternatives may happen is made highly probable by the events of the very winter just passed. Snow to the depth of many inches, even feet, fell on three separate occasions over all home territories of these woodpeckers in southern California during the winter. And this snow remained on the ground for days on one of these occasions at Cuyamaca and was there accompanied by a layer of ice on much of the surface of the lake.

To my very keen regret I was unable to visit Cuyamaca during the snow periods to see how it was faring with my birds. But there is little doubt that if the group I saw storing acorns last fall, or some other group, were there through the times of snow and ice, their lives depended largely if not wholly

upon the stored nuts. But I am wandering from the main point, namely, that of why the poor birds should not recognize the folly of picking up stones and putting them away for food *at the time* the folly is committed.

Saying nothing about their faulty observation as to the difference in weight, shape, color, etc., between acorns and pebbles, even the most acorn-resembling ones, I raise this further question on the strength of my own observations: Is it likely that pebble-storing birds never try to eat the pebbles during the very time that they are gathering and storing them? The fact that the birds I saw storing acorns last fall were at the same time feeding on the nuts makes me strongly but sadly suspicious that pebble-storers would also try simultaneously to feed on their gatherings and would go right on storing them for future use in spite of their demonstrated uselessness.

I fear we must conclude that while these birds know enough about their own welfare not only to ask for acorns, but, under normal conditions, to give themselves acorns, under conditions more or less abnormal, they ask for acorns but give themselves stones.

At any rate, whatever the detailed interpretation we put upon these apparently not very rare cases of pebble storing, we can not, so far as I can see, avoid recognizing in them serious imperfection in the adaptiveness of the food storing habit. This is the point where it should be mentioned that the birds sometimes store other nuts than acorns. Mr. Robertson, mentioned as one of my correspondents, tells of the storage of English walnuts at Buena Park, California; and Mr. Gignoux reports, as indicated by the title of his article already quoted, the storing of almonds in the region of Marysville, California.

This turning of the birds from their ancestral nut crop to other kinds of nuts entirely new to them, might be put to their credit as evidence of their resourcefulness in finding new kinds of food. It should be said, however, that as yet evidence is lacking that the newly found nuts are actually used as food, while in the walnut instance reported by Mr. Robertson the evidence seems conclusive that they were not so used. The birds disappeared from the scene of their activities soon after the storing was done, Mr. Robertson says, and never returned so far as he knew, the walnuts being finally "eaten by ants and other insects."

Another conclusion previously reached about the storing business was summed up thus: "Large numbers of acorns are sometimes stored, the use of which is so long delayed that the acorns become wholly or largely unfit for food, and this where the bird population seems normal."

This conclusion has been strengthened not only by finding on my last visit the same old spoiled acorns described in "storage-tree A" of my former communication, but by finding several other trees not seen before, containing rotten and half-rotten nuts. This was particularly striking for a tree found at Pine Hill, fifteen miles to the north of Cuyamaca. Details of the additional instances of this sort we need not linger on here, so similar are they to what was set forth on the point in my earlier publication. Only this deserves to be added: Later observations indicate more loss of acorns than I previously recognized from their being covered up and fused into the holes by the pitch of pine storage-trees. The aggregate of loss from this cause is far from insignificant, so it seems.

But a long way the most interesting addition to what is known about bad business by woodpeckers in food storing comes from Mr. Peck's communication

mentioned above. This relates to another subspecies (*Melanerpes formicivorus albeolus*) of the genus to which our bird belongs, and which lives in British Honduras.

Not only do the Central American birds store acorns in drilled holes as do the Californians, but in addition they make much use of hollow trees; and it is in connection with this last way of garnering that Mr. Peck's contribution is especially interesting. "I have seen," he writes, "a hollow pine tree with a cavity six or eight inches in diameter filled for a distance of nearly twenty feet with acorns dropped into a good sized hole at that distance above the ground." Such acorn-filled trees, he says, are not uncommon. Each tree-full represents, Mr. Peck believes, the accumulated gatherings of several years. And we read, "Sometimes an opening at the bottom showed the earlier acorns deposited, completely decayed and crumbling to dust."

Furthermore the author narrates that acorns are sometimes stored in houses in such fashion that "it would be utterly impossible for the birds ever to make use of the acorns in any way."

Besides this storing in quantities and places such that utilization of the material would be impossible even were it needed, Mr. Peck believes that food conditions in British Honduras are such as to make storing quite unnecessary. And he remarks, much to the point: "These instances show how an over-developed instinct may lead to actions not only useless but highly absurd." My only comment on this statement is that, speaking strictly, such performances are due not so much to *over-developed* as *under-inhibited*, or *badly controlled* instincts.

One more question raised by Mr. Peck, suggested by his doubts as to whether storage is needed at all in the midst of the tropical bounties of Honduras. All the facts taken together suggest, he says, that the "Central American bird was derived from the more northerly form or from northern ancestry, which acquired the instinct under conditions like those now existing in California, and that, as it pushed gradually into the tropics, it retained the instinct long after it had ceased to be of any utility." But, sagely remarks Mr. Peck in conclusion, "Such speculations are of doubtful value." So far as this popular type of speculation concerns the origin of maladaptive instincts its usefulness is not only doubtful, but, unless indulged in with great caution, is positively harmful.

My reason for referring to the matter here is the opportunity afforded for making a quite different point from that of the *origin* of instincts, namely that of their *persistence* beyond their usefulness.

Whether the absurd performances of these Central American woodpeckers are really an instance of such persistence does not matter for the point I wish to make. Almost certainly many, many instances of it do occur both in creatures below man, and in man; and the point I wish to make very particularly is that the inhibition or control of them to prevent their resulting in absurd performances, is exactly part of the function of intelligence. Such activities are often excused or palliated on the ground that they are instinctive and natural; and hence must be accepted as a sort of Fate, however absurd or even harmful they may be. But what I wish to insist upon is that *nature herself* has provided, or more strictly is providing, the necessary remedy, this being the very phenomenon we name intelligence. Nowhere do we find greater willingness and facility in correcting destructive processes than in nature. Intelligence is sometimes

defined as the ability to form associations. But this conception of it misses its very kernel. Not the ability to *form* associations, but the ability to use them after they are formed, for the well-being of the organism, is the cream of intelligence, as I understand.

Association-formation is of the quintessence of life itself; and intelligence plays the secondary, though vastly important role of making the associations serve the needs of the organisms, individual and racial. Marvelous though Intelligence is, as one of the nature's masterpieces, Life is still more marvelous.

But I must stick to my text—Woodpeckers—and not get shunted off into philosophy. Perhaps, however, this little shunt is not wholly amiss. It would not be if perchance it should help us more appreciatively to understand the varied and subtle ways nature has not only of preserving but of improving her processes.

Several other points at which the later observations have confirmed the earlier must be passed by in the interest of brevity.

(3) The entirely new matter (for these studies) must now be turned to. The first to be mentioned is the discovery of an adaptation in the storing business that is new to me at least, and came to me as a genuine surprise and had to face considerable incredulity before it won a secure place in my mind. This discovery is that to a certain extent *the store holes are made to fit the size of the acorns they are to receive.*

Although I had heard intimations of this sort of thing I had not seriously considered it until the evidence forced itself upon my attention. Briefly stated the facts are these: In the Cuyamaca region acorns of two species of oak are chiefly used. These are the Black Oak (*Quercus kelloggii*) and the Live Oak (*Q. wislizenii* or *Q. agrifolia*). The nuts of the Black Oak are sharply larger, especially in thickness, than those of either of the other species. Thus, 11×25 mm. is about the average measure of black oak nuts, while 10×28 mm. would not be far from the average of those of the other species, as I have found them in the Cuyamaca region.

In order to exhibit the evidence which establishes the above conclusion, a few sentences about the distribution of oaks and pines in the field of observations are necessary. The black oak and the Jeffrey pine used chiefly though not exclusively for storing are very nearly coincident in occurrence in the localities of observation; while the live oak, though mingling rather extensively with the other species, belongs characteristically to lower elevations. As a consequence, where the live oaks are at their best there are no pines at all. Then there is an intermediate zone or belt where in certain localities pines and well developed live oaks intermingle, but where there are no black oaks. In these localities, consequently, conditions are right for using pine trees in which to store live oak instead of black oak acorns. And this is done.

It will be noticed that holes into which live oak acorns (10 mm. average diameter) would fit closely would not admit the black oak nuts (17 mm. average diameter) at all. Now simple inspection recognizes very clearly that storage pines, at the elevation at which black oaks abound almost exclusively, have very few holes indeed too small to admit the nuts of these trees.

On the other hand mere inspection of "granaries" at lower elevations where live oaks abound give the strong impression that the holes average considerably smaller. And measurements confirm this impression. Thus the average diame-

ter of holes at the upper, or black oak elevation is not less than 20 mm.

The following table gives the diameters of "random sample" holes on three trees at the lower elevation where live oaks largely prevail:

	13 mm.	16 mm.	20 mm.	22 mm.
1st tree	35 holes	11 holes	14 holes	1 hole
2nd tree	46 holes	16 holes	14 holes	1 hole
3rd tree	53 holes	8 holes	1 hole	1 hole

These measurements make it in the highest degree probable that, in general, smaller holes are made for the slimmer live oak nuts. The quantitative data were obtained on my visit of August 27-28, 1921, which was before the year's harvest began; so very few indeed of the holes on the trees examined contained nuts or even remains of nuts.

But the visit of November 19-20, shortly after the harvest was completed, furnished the clinching information, for one storage at least. This tree was well down to the edge of the pine zone, consequently where live oaks largely predominate. I copy from my notes almost verbatim: "An enormous number of nuts, apparently all of live oak, many of them in brand new holes. Vast majority of the holes small, just large enough to admit the slim nuts. A few larger holes scattered among the small ones, but none of them so far as I can see containing nuts. This distribution of size of nuts relative to size of holes is very striking. Not infrequently the long slim nuts put side-wise into chinks in the bark; but seemingly never into the large holes."

That there are real advantages in this fitting of hole size to acorn size there can be little doubt. For one thing acorns which fit snugly into clean-cut holes as was especially the case in this tree, would be better protected against both rain and marauding mammals than would those merely thrown, so to speak, into over-sized, ragged holes.

Again, there would be a saving of labor in the making of holes no larger than the actual necessities call for. It must be confessed, however, that in view of the abundant evidence of fruitless work by these birds, one may well question the potency of this advantage. It does seem, though, that it may count for something when the hole drilling has to be done in the bark of the live oak, which is much harder and rougher than is the pine bark. And there is no question that in the field of these observations, the live oak holes made for acorns of the same species, present this size adaptation.

The question of how such an adaptation is brought about is important but impossible to answer because of the meager information. Two possible approximate explanations suggest themselves. First: One and the same bird may pass back and forth between the black oak and the live oak regions and drill large holes while in the former and small holes while in the latter. Second: One set of birds may become localized in a black oak region and another set in a live oak region, so that holes of different sizes as noted would be the work of different birds. On the basis of what we know in general about the intelligence of these birds, the latter explanation would seem most probable; but it is at this point that information fails us.

The birds surely do not restrict their acorn-gathering to oaks in the immediate vicinity of the storage trees. There is evidence of several sorts to this effect, the most conclusive of which is the fact that I have seen them in the act of carrying nuts for a distance of half or three-quarters of a mile. But this distance is

small in comparison with the eight or ten miles which separated the large-hole from the small-hole trees as indicated above.

However, observations of quite different character suggest rather strongly, though they do not prove, that the birds do at times move about for considerable distances. These observations I now present in brief, not, however, so much for their bearing upon the general economic problem, as it may rightly be called, of these woodpeckers in the Cuyamaca region. The problem concerns the abundance and distribution of the acorn crop from one year to another and in the same year.

The black oak acorn crop was bountiful in 1921 in a small area on the south side of the lake, but was almost nothing in any of the other areas I was able to visit. Of the several hundred trees which I examined more or less carefully between the lake and Julian and Pine Hills, a distance of about fifteen miles, not a single one was well loaded, and very few indeed bore any nuts at all so far as I could see.

And quite similarly was it with both black and live oaks in the opposite direction from the lake; that is, toward Descanso distant about twelve miles. Although I devoted considerable time to inspecting many trees over several square miles, I saw surprisingly few nuts—though obviously the birds were more successful in finding them, in at least a few places, than I was, for as already shown they were able to garner in a good supply of live oak nuts for a few storage trees far from the lake.

And this distribution of abundance of acorns certainly corresponded closely with the abundance of birds during the harvest period. I saw more birds on the square mile, more or less, at the lake where the acorn crop was good than on all the rest put together of the twenty or more square miles covered by my examination. So far as I could determine there were something like two dozen birds at work in the area adjacent to our camp during the week of our sojourn there: and I surely did not see as large a number in all the rest of the area. It must be said, however, that my observations were much fuller on the lake area than anywhere else.

Now this distributional state of things, both as to acorns and birds, strongly suggests, as already hinted, that the birds had gathered into the small area of abundant crop from many miles around. And this suggestion has a clear bearing on the question of what birds drill the different sized holes.

These observations and reflections on the general economics of our woodpecker, fragmentary though they are, yet suffice to call attention to a research problem in natural psycho-biology which appeals to me not only as fascinating, but as promising rich returns for any one who would take it up and follow it up in dead earnest. The concatinated queries involved fairly strike one in the face so sharply do they stand out: and they seem numberless.

Take those connected with the acorn crop, for example. What about its variation from year to year, and from place to place in the same year? What part do heat and cold, wetness and dryness, and other climatic factors play in the business? Are there really barren oak trees as well as barren fig trees, in nature? And what of the various nut moths that depend upon acorns for their existence? How hard are they on acorn production and so upon the oak forests; and how much harder on acorns and oaks would the insects be if the woodpeckers were not in turn hard on the insects?

It is impossible for anybody to understand the character even, to say nothing of the substance, of the major problems of psycho-biology *who knows little or nothing about them from the standpoint of what has been aptly called the "web of life."*

There remains only a few minutes in which to speak on the most interesting part of these "further observations"—the part, I mean, which has to do with what I saw the woodpeckers actually doing. To me, at least, this is the most interesting part largely because I had never before seen them "on the job." My desire of long standing for a chance to watch the birds at work was whetted by Henshaw's remark that the varied things done by them "bear no resemblance to work in the ordinary sense of the term, but is play." Perhaps this view interested me especially because at the time of reading it I had lately been going somewhat extensively into the literature of play.

During the first three days in camp it rained almost constantly and the woodpeckers "laid off" completely from harvesting and were seen very little. On October 2 it stopped raining about noon, and work was begun promptly and vigorously. Three storage trees within easy stone's throw of our tent gave ample opportunity for watching—especially since several oaks well acorn-laden were also near by. All the harvesting I saw was from the tree tops directly. In no instance did I see nuts picked up from the ground. In fact the birds hardly came down to earth at all.

One of the first things to attract my special attention in connection with the birds was the slight attention they paid to me. I found I could sit on a rock within a few yards of a storage tree and watch the operations to my heart's content without seeming to be so much as even noticed by the busy bodies.

HOLE DRILLING

I will speak first about the pecking business; and a quotation, nearly word for word, of one entry in my notes will tell the story better than I could tell it otherwise.

> In two instances particularly birds on side of tree trunk pecked hard for several minutes in same spot, apparently at hole-drilling, but too far up tree to permit seeing exactly what was being accomplished. One of the two birds almost certainly working in a hole, whether old or wholly new I could not be certain. After long pecking this bird quit, ran out on near-by branch of tree, pecked a little there, ran back to trunk, hitting a few raps in one place then in another. This more or less indeterminate pecking extremely characteristic, every bird doing some of it wherever alighting, on trunk, or limb, and whether having come to the tree empty-beaked or after having put away its acorn.
>
> The other long-time-pecking-in-the-same-place bird just mentioned finally flew away as a third bird came with a nut in its beak. This nut deposited very near to where the just-flown bird was pecking. The arrival may have placed its nut in the hole made by the other bird, but this uncertain.

This came as near as anything I saw to supporting the conjecture that the birds cooperate so specifically as to make some individuals hole-drillers while others are harvesters and storers. Everything else seen—and there was much of it—indicated that all workers peck holes and all gather and stow away nuts; and that no storer has special holes on the same tree or has any special tree at least if several storage-trees are near together.

ACORN-GATHERING AND STORING

Since the acorns are almost invariably placed in the holes butt-end out, and since the butt is, of course, always lodged in the cup as long as the nut is on the tree, it follows that somewhere between the picking of the nut and the storing of it the nut must be turned end for end. I was unable to see where or how this is done.

In no instance did I see an individual deposit its acorn at once and at the place of alighting, even though any number of empty holes might be at the place. The bird may light on a branch and, after a little delay, run along it to the trunk, where alone, so far as I have seen, the nuts are stored. Or the trunk may be the lighting place and considerable running about done upon it before the nut is finally disposed of. In one case particularly, the laden bird lit within a few feet of the ground, started immediately up the trunk, and scarcely halted until it reached nearly half way to the top, passing on its way dozens of empty holes.

Quite as frequently as otherwise, the nut is placed in a hole and left for a moment, then taken out and carried on to some other locality. Almost always the nut is hammered more or less after being placed in the hole, this being done even though the hole is large enough and deep enough to admit the nut completely and more too, without forcing. But not infrequently nuts are placed in holes not quite large enough or deep enough to take them in all over. Reference was made to this fact in my previous report, and attention called to the exposure of such nuts to the depredations of other nut-eating creatures such as squirrels. Why nuts which slip into the holes easily to well below the surface of the bark should be thoroughly hammered while others even though hammered are nevertheless left sticking out considerably, is not obvious.

About the most surprising performance I saw connected with the storing was the taking of nuts from holes where they had previously been left and inserting them in other holes some distance away. The first few instances of this noticed seemed so strange that I doubted whether I was "seeing straight".

It seemed likely that the nuts taken out were really those just put in but not yet satisfactorily placed, for, as just indicated, this sort of thing was the rule rather than the exception. But more careful attention removed all doubt. Quoting from notes: "Bird with acorn alighted directly on tree trunk, ran up a little way, inserted acorn; ran up a little farther, picked out another nut, ran up still higher and deposited this second nut".

These narrations on hole drilling and acorn-gathering and storing could be elaborated much farther; but as they are fairly illustrative of all I saw, this is unnecessary.

Reverting now to Henshaw's idea about the character of the whole performance, I should say that while work in the narrower sense of human industrial activity would not be an appropriate name for what the birds do, neither would play in the narrower sense of human pass-time activity.

In the first place acorn harvesting by the birds has reference to a definite, future need of the creatures, no less certainly than does grain harvesting by men. From the standpoint of prospective significance the two are so much alike that there seems no real ground for not calling them both work if either is so named.

In the second place there is a kind of persistence, or fidelity to the task, about both woodpecker acorn-harvesting and human grain-harvesting that does

not seem to belong to real play. Undoubtedly, the play of children and animals is often very strenuous and persistent. Nevertheless it has a sign of irresponsibility upon it that human harvesting and, so it seems to me, woodpecker harvesting do not have.

The quality in the woodpecker work which, as I imagine, reminded Henshaw of play is a certain indiscriminateness or diffuseness of the activities. Certainly there is no meagerness, no stinginess about them. But there is lots of uncertainty as to their direction and application. Consider the pecking, for example. The amount of unconcentrated effort that a bird makes as it runs about on the side of the tree trunk, or on the larger branches, delivering one or two whacks with its beak here, four or five there, in an old hole seemingly long since finished, or in no hole at all, makes an observer wonder whether any individual ever settles down to the task of drilling a complete hole, that is, of beginning the job and carrying it through to the end with no interruptions excepting such as may be imposed by the inherent limitations under which the work is done. And the observer is led thus to wonder even though birds are occasionally seen to peck in one spot for some minutes with only momentary cessation.

I should say the performance resembles more that of young children when doing household tasks assigned them by their parents, than the play of such children. Dozens of the little side acts, as they may be called, which the birds do, remind one strongly of the momentary stopping of a small boy when running on a family errand, to pick up a stone and throw it, more or less aimlessly, at a telegraph pole or any other object that may happen to be near.

At this point comes in a question of real interest raised by a cursory observation. That question is, Do the birds really "stop to rest" once in a while in the course of their labors? The observation may be given by a transcription from my notes.

> **A curious incident this morning: A half-dozen or more birds busy on the job. At about 8:45 one noticed clinging to the under side of a dry limb, quite motionless. Remained in the same spot and position till 9 o'clock with only a slight movement of the head once in a while. During the fifteen minutes not a woodpecker was seen or heard around this tree. Then all, including the one watched, began to squawk, and fly around. Was this a rest period for all the birds in this group?**

Of course I was on the look-out for a recurrence of this the next morning. And sure enough, at 9 o'clock, a bird was discovered clinging to the under side of a much arched, dry top of a near-by black oak. And this individual remained quite as motionless as had the one watched on the previous morning, for ten minutes after being discovered. However, there was not so complete a cessation of activity by the other birds as on the morning before. In this instance the quiescent bird was near enough to enable me to see, with my glasses, that its eyes were open and winking—which fact was taken as proof that the bird was not asleep.

On the third morning I saw nothing really suggestive of a rest period. But as my observation had to be made this time in the midst of breaking camp and packing up, I could not see much of what the birds were doing.

When one reflects that work begins early in the morning (by 6 o'clock at latest) and goes on almost incessantly, it seems not unlikely that three hours of it would bring fatigue enough to justify some minutes of complete rest. This question certainly deserves more study than I was able to give it.

Let us now revert to our leading question in order to see how it looks in the light of the facts we have been examining. That question was, you will recall, How nearly perfect is the adaptation of the activities connected with food gathering and storing by the California woodpecker? If the facts are really as presented no one can, I think, fail to see that none of the adaptations are perfect and that some of them are so imperfect that they are apt to result in serious injury or even death to the birds.

So here these "Further Observations" must end. One is terribly tempted to plunge into a flood of inquiry as to what such facts about the lives of woodpeckers may mean for the lives of men. But, of course, when such a plunge would involve pulling with one an entire company of his fellow beings, he must forbear. Forbearance can not, however, restrain me from saying this much as my positively last ending:

The only possible way of correcting imperfections in adaptations of the sort we have been considering, is through what we name intelligence. And this is equivalent to saying that *Nature's way of reducing to a minimum the inefficiency, the wastefulness, and the dangers involved in all living nature is what has been given the name Intelligence.* Such is the central thesis of my psychobiological philosophy.

Scripps Institution for Biological Research, La Jolla, California, March 23, 1922.

FOSSIL BIRDS FROM THE PLEISTOCENE OF McKITTRICK, CALIFORNNIA

By LOYE MILLER

IT HAS been my good fortune and a great pleasure the past winter, to cooperate with mammalian Palaeontologists in the exploration at McKittrick, California, of a new exposure of Pleistocene asphalt comparable in nature, if not in extent, with the renowned Rancho La Brea beds of Los Angeles. Merriam and Stock (Science, n. s., LIV, p. 566, Dec. 9, 1921), have published a brief note upon these beds, enumerating the more characteristic mammal remains that have come to light in a brief reconnaissance. At the invitation of Dr. Stock, under whose direct supervision the work is going on, I spent a brief time with his field party from the Museum of Palaeontology and have undertaken the study of the avian remains excavated. This preliminary note is offered to CONDOR readers because of the live interest they have taken in the work at Rancho La Brea and the right good service that many Cooper Club members have rendered in contributing comparative material. All specimens taken out are deposited in the Museum of Palaeontology of the University of California at Berkeley.

The most casual inspection of the three hundred thirty odd specimens of McKittrick birds now on hand brings out some marked differences between this assemblage and those from other western horizons. To determine the underlying forces that have brought about these differences constitutes the present problem.

Perhaps the most striking feature that was brought out in the study of the Rancho La Brea birds some years ago was the great abundance, both in species and in individuals, of its raptors, many of which were of large size. Three condors, two smaller cathartids, two Old World vultures, a caracara, and the great *Teratornis* made up the contingent of scavenging raptors. Six eagles, three buteonines, three falcons, the marsh hawk, and the white-tailed kite, represented the active predators by day, while a night shift of six species of owls continued the predatory work after sunset. More than half the total bird remains taken from these beds came from birds of the orders of raptorial habit—a most unusual situation indeed.

The collection from McKittrick is admittedly a limited one, yet it is sufficient to show the totally different proportions of its fauna. The golden eagle (*Aquila chrysaëtos*) is the only raptor represented by more than one or two specimens, but of this lusty fellow there appear some ninety determinable bones. *Polyborus* (sp.) is the next raptor in point of numbers, with seven bones; the little *Falco sparverius* follows with four; and *Circus hudsonius*, *Falco peregrinus*, *Geranoaëtus* (?), *Cathartes* (?), and *Teratornis*, with one specimen each. In contrast with this limited predatory population, the water birds, so scarce at Rancho La Brea, constitute more than two-thirds of the determinable remains thus far taken from the new horizon. Anserines, ranging in size from a teal to a goose, are in the majority, being represented by 33% of the whole collection. Limicolines follow in order with 20%, whereas at Rancho La Brea they number less than one in ten thousand. Two large storks resembling *Ciconia maltha* and *Jabiru mycteria* are present in numbers approaching 15%, while herons and cranes are well represented.

The order of the scratchers has contributed to the collection thus far but a single bone, the coracoid of a quail indistinguishable from the present bird of the region, *Lophortyx californica*. Rancho La Brea, though equally poor in quail remains, is abundantly rich in the big *Parapavo*, as yet undiscovered in the McKittrick. The two localities agree in the total absence of all the gull tribe, as well as in the great scarcity or entire absence of all sorts of diving birds, a matter of considerable interest in view of the abundant ducks and geese.

While the collections from McKittrick are admittedly meager as yet, they are, nevertheless, very strongly indicative of topographic differences that must have existed between the locality and that of Rancho La Brea at the time of entombment of the bird remains. The indicated contrast lies in the different amounts of open water and of cover offered as attractions to them.

At Rancho La Brea, the great abundance of *Parapavo* strongly suggests a considerable amount of timber, at least in spots. There are, to be sure, osteologic differences between this bird and its present-day relatives, sufficient to admit of great diversity of habit, yet *Parapavo* could scarcely have been a bird of the open plains. The presence of bedded leaves, of twigs, and even of goodly sized tree trunks further bears out this impression of cover, while the scarcity of anserines and the almost total absence of limicolines indicate the absence of shallow, open water in bodies of any great size. Water there was to be sure, but it might well have been in very narrow basins or in brushy seepage areas augmented during the rainy season into a slow-moving stream along the bed of a slight depression. Just such conditions, except for the absence of timber, prevail in the im-

mediate neighborhood of Rancho La Brea today. Moderate shift of drainage lines would readily produce, or as readily destroy, such thickets.

At McKittrick, quite a different picture presents inself to the imagination. Mud flats of some appreciable extent are the insistent demand which such a wader population would make upon our powers of reconstruction. These dabblers call for mud in quantity, spread out, free from thicket, and barely exposed above quiet waters. The anserine population makes a somewhat similar demand. To be sure, an occasional duck will drop down into the smallest of pools, but this goodly host of paddlers of all sizes certainly indicates open water somewhere in the near vicinity. Storks, herons, and cranes in force raise the water birds to a two-thirds majority (67%). Surely such a population could have been assembled only by the lure of open country. Conditions during the Pleistocene might well be considered to have been much like those now prevailing at Buena Vista Lake a few miles to the eastward of McKittrick.

The oil seepage which entrapped the birds may well be considered to have been located at or somewhat back from the margin of such a lake. The upheaval and subsequent erosion that resulted in the present location of the asphalt lens upon a hillside could easily have obliterated other evidences of the lake by removal of typical lacustrine deposits.

The other alternative to such a reconstruction, a view supported by the abundant remains of mud-gathering swallows, is that of an oil seepage accompanied by springs of fresh water discharged through vents of common origin with the oil. To such springs, in seasons of increased alkalinity of lake waters, many species of birds might repair for drink. Probably the hypothesis most nearly approximating the truth, however, is of a marginal seepage connected at least by slough or muddy runway with a lagoon of appreciable size.

The chief objection to this lacustrine reconstruction is the previously mentioned fact that remains of gulls and divers are entirely lacking. But may we not find some measure of reason for this discrepancy in the habits of these birds? Would not their habits offer a measure of immunity from the dangers of the oil-seepage that ducks and waders would not enjoy? They are birds of open water or sand bars, rather than dabblers in the mud. Buena Vista Lake is today a notable breeding place for ducks of several species. Their nests are placed in grassy and marshy spots in the vicinity of, yet removed from, open water. Runways to and from such sites might readily lead the birds into danger from oil seepages and deprive them of the immunity accorded to gulls and grebes.

Can we derive profit in comparing the McKittrick fauna with that of other lacustrine deposits such as Fossil Lake, Oregon? At this locality there has been worked out one of the most varied faunas thus far recorded from western America. Shufeldt (Journ. Acad. Nat. Sci. Phila., ser. 2, no. 9, 1892, p. 389) catalogued fifty or more of its species in 1892 and several have been added since that time. This interesting fauna includes the following groups: Order Pygopodes, 8 species; Longipennes, 9; Steganopodes, 2; Anseres, 30; Odontoglossae, 1; Herodiones, 3; Paludicolae, 2; Limicolae, 1; Gallinae, 5; Accipitres, 3; Striges, 1; Passeres, 2.

This list is notably lacking in storks, in cranes, and in scavengers, while herons and shore birds are but sparingly present. On the other hand, it is rich in divers, in gulls, and in ducks. The several students who have studied the assemblage of species agree that an open, shallow, and possibly ephemeral lake

constituted the Pleistocene environment that attracted them. Whether subject to complete periodic obliteration or not, it probably did fluctuate greatly in extent within its shallow basin. The fossil remains are found sparsely distributed over a wide area and preserved in the silt-like accumulation at the bottom of the ancient lake. There is no evidence of concentration at one point such as appears at both the asphalt horizons. It hardly seems credible that waders were lacking at Fossil Lake or that gulls and divers shunned the neighborhood of McKittrick during Pleistocene time. The difference between the two avifaunas is more probably due to difference in method of entombment rather than to diversity of physiographic or of climatic environment. Probably the birds actually present during the Pleistocene were much the same in the two localities, although it is likely that there was more marsh and slough country in the neighborhood of McKittrick.

On the other hand, the differences between the McKittrick and the Rancho La Brea collections are due probably to an actual difference in fauna due to diversity of the immediate environments of two localities in which the method of entombment was the same.

Regarding the particular part of the Pleistocene to which the McKittrick assemblage belongs, it is too early yet to comment at any length. The writer has already pointed out (Univ. Calif. Publ., Bull. Dept. Geol., vol. 7, no. 5, 1912, p. 105) the inaccuracy of avian remains as indices to the relative age of two faunas where one of them includes a much larger proportion of migratory species than does the other. Just such diversity of habit sets off the McKittrick assemblage from that of Rancho La Brea. This fact coupled with the poverty of material thus far excavated from the former beds makes comment upon their relative ages at present inadvisable. Both seem, however, to have been accumulated during a time when the climate was warmer than at present, though whether or not during the same Pleistocene amelioration can not be stated.

Los Angeles, California, May 15, 1922.

A NEW SPARROW FROM SOUTHERN CALIFORNIA

By W. E. CLYDE TODD

A FEW years ago, in overhauling the birds of the genus *Aimophila* in the collection of the Carnegie Museum, I discovered that certain specimens of *A. ruficeps* from southern California were appreciably different from others coming from the region of San Francisco Bay (Nicasio, Marin County). The latter agree among themselves, and with a good series from various other localities in the state, from Sutter County on the north to Los Angeles County on the south, which I have examined in this connection. *Ammodromus ruficeps* of Cassin, described in the Proceedings of the Academy of Natural Sciences of Philadelphia (VI, 1852, p. 184) came from the Calaveras River, near Stockton, California, as we learn from the A. O. U. Check-List of North American Birds (ed. 3, 1910, p. 272). This series from central California agree well with the figure in Cassin's Illustrations of the Birds of California (1854, pl. 20); but in order to make sure of the correct application of the name I forwarded examples of both forms to Dr. Witmer Stone with a request to compare them with the type-specimen in the Philadelphia Academy. He writes as follows (February 15, 1917): "The type of '*Ammodromus*' *ruficeps* is like the Nicasio specimen, i. e., buffy instead of grayish below." It therefore remains to provide the southern California race with a name, and I propose to call it

Aimophila ruficeps canescens, subsp. nov.

Subspecific characters.—Similar to *Aimophila ruficeps ruficeps* (Cassin), but wing and tail longer and under parts less buffy, more gravish in tone. Similar also to *Aimophila ruficeps sororia* Ridgway, but darker above, and darker, more grayish, below.

Type, no. 14,586, collection Carnegie Museum, adult male; San Diego, California; January 23, 1894; A. W. Anthony.

MEASUREMENTS

No.	Locality	Wing	Tail	Bill	Tarsus
Aimophila ruficeps ruficeps:					
14589[1] ♂	Nicasio, Calif.	58	60	10	19
44518[2] ♂	Nicasio, Calif.	53	58	11.5	19.5
154223[3] ♂	Berryessa, Calif.	60	65	10.5	21
27323[4] ♂	Dunlap, Calif.	61	67	12	21
26285[4] ♂	Varain Calif.	59	64	10.5	19.5
29037[4] ♂	Claremont Creek, Calif.	58	61	12	20.5
Eleven males, *fide* Ridgway		59	63.5	11.5	20
Aimophila ruficeps canescens:					
14585[1] ♂	San Diego, Calif.	64	70	11	20
14586[1] ♂	San Diego, Calif.	64	68	11	19.5
14587[1] ♂	San Diego, Calif.	67	67	12	19
Aimophila ruficeps sororia:					
71335[1] ♂	Sierra de Laguna, L. Calif.	60	63	12	21.5
15941[2] ♂	Triunfo, L. Calif.	63	68	12	20.5
15945[2] ♂	Triunfo, L. Calif.	60	60	12	20.5
15946[2] ♂	Triunfo, L. Calif.	62	63	12	20.5
47922[5] ♂	El Lanz, L. Calif.	63	64	12.5	21

[1]Collection Carnegie Mus.
[2]Collection William Brewster.
[3]Collection U. S. National Mus.
[4]Collection Univ. Calif. Mus. Vert. Zool.
[5]Collection Mus. Comparative Zool.

Remarks.—Specimens from northern Lower California resemble those from San Diego, and clearly belong to the same form, but as they are more or less worn they are not included in the table of measurements. These specimens are the same ones referred to by Mr. Anthony (Zoe, IV, 1893, 242) as being "practically indistinguishable from southern California examples", but he seems not to have suspected that the latter were not true *ruficeps*. *A. ruficeps canescens* is really intermediate in its characters between *A. ruficeps ruficeps* and *A. ruficeps sororia*, but is grayer than either, and is evidently as well entitled to recognition as certain other races of birds found in this general region. It doubtless grades into the former in Los Angeles County, California, as indicated by a specimen from Pasadena (Mus. Vert. Zool., no. 35813), but where it meets the range of *A. r. sororia* is an undetermined question.

Specimens examined.—California: San Diego, 3. Lower California: Guadalupe Valley, 1; Sansal del Comanche, 3; Piñon, 1; Todos Santos Island, 2. Total, 10.

My acknowledgments are due to the authorities of the several institutions already specified for the loan of material for comparison, and to Dr. Harry C. Oberholser for his advice.

Carnegie Museum, Pittsburgh, Pennsylvania, May 11, 1922.

STATUS OF THE CRESTED JAYS ON THE NORTHWESTERN COAST OF CALIFORNIA

By JOSEPH MAILLIARD

WITH MAP

SINCE the year 1908, when it was found that the crested jay of that part of the Humid Coast Belt lying in Sonoma County, California, was not distinguishable from the Blue-fronted Jay (*Cyanocitta stelleri frontalis*) of the interior mountains and the southern portions of California, the idea of intergradation on the northwest coast of this state between the Steller Jay (*Cyanocitta stelleri stelleri*), of the southern Alaskan and British Columbian coasts, and the Coast Jay (*Cyanocitta stelleri carbonacea*), of the central humid coast belt, has, in my judgment, been open to doubt. It hardly seemed reasonable that there should be such an intergrading toward the north when the Coast Jay is not only cut off abruptly in the central humid coast belt by a strip of non-coniferous association, unattractive to this genus, in northern Marin and southern Sonoma counties, but its distribution also is interrupted by the appearance of the Blue-fronted Jay on the opposite side of this non-coniferous barrier.

In 1902, Dr. Walter K. Fisher published an article upon the status of *Cyanocitta stelleri carbonacea* (Condor, IV, pp. 41-44), in which he gives the distinguishing characteristics of the different members of the genus *Cyanocitta* on the Pacific Coast, illustrated by a map showing their distribution as understood by him at that time. This paper was written not long after the Coast Jay was described by Grinnell (Condor, II, 1900, p. 127), when much less was known of

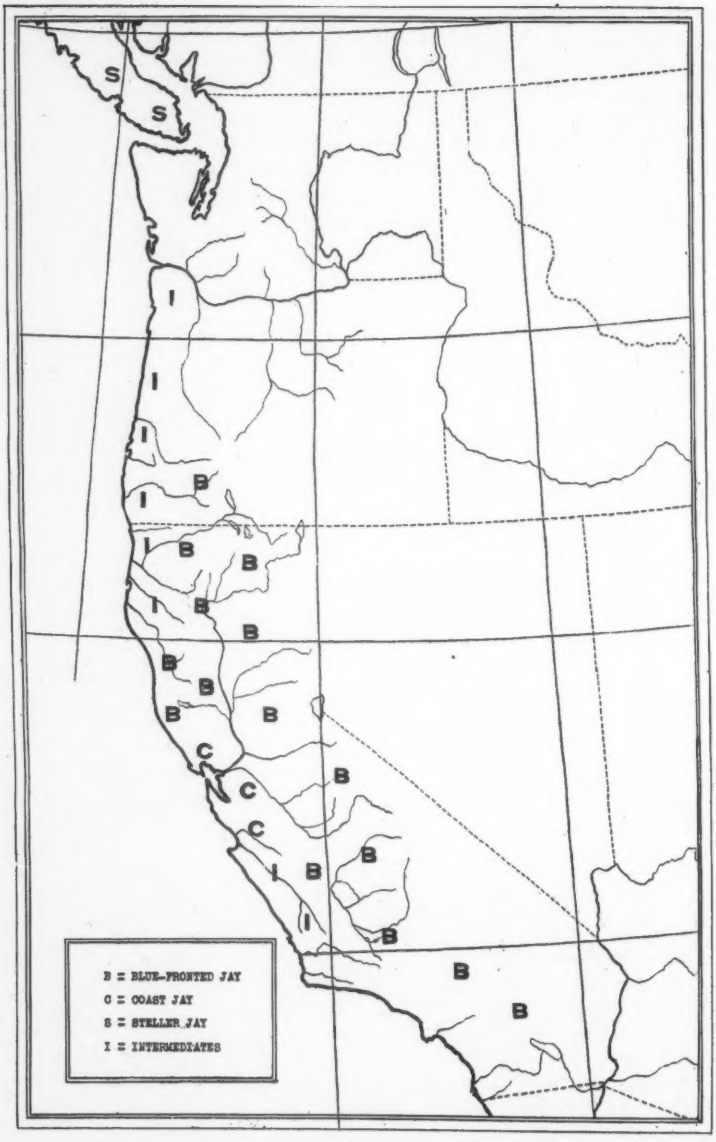

Fig. 33. Map showing distribution of the different races of Crested Jays along the coast line from Vancouver Island south to extreme southern California.

these races than at present, and when there was a comparatively limited number of specimens at Dr. Fisher's disposal.

From his conclusions I infer that insufficient attention was given to the matter of using strictly comparable stages of plumage, or to the consideration of the dates of capture of specimens examined and the various degrees of fading of colors shown at different seasons of the year. It is obviously unfair to compare specimens from one locality, of one season, with those from a different locality of another season of the year. There is too much seasonal change in such cases to allow of fair comparison, and I think that some of the errors that have been handed down have come about through failure to emphasize this principle. Dr. Grinnell (Auk, XIX, 1902, p. 128) remarks in this connection, that "a series of *Cyanocitta stelleri* from the cloudy, humid Sitkan District taken in June and July show but slight traces of wear; while specimens of *Cyanocitta stelleri frontalis* from the arid Sierra Madre Mountains of southern California taken at the same season are so ragged and faded as to almost completely destroy the fresh fall coloration".

Examination of a large number of specimens, some of them many years old, taken at different seasons of the year, shows that fading, induced by exposure in the case of live birds (or by age in the case of even many well-kept skins) reduces the proportion of black and increases the amount of brown on the heads and backs of the three races considered in this paper. Some fading takes place in *stelleri*, but the mantle remains very dark, with less brown showing than in *carbonacea*. In the case of *carbonacea* the brown is very evident even in fresh plumage and becomes more pronounced as the seasonal changes progress, ending with a rich or warm brown by the beginning of the summer molt.

The first of these races is the darkest all over, with the mantle a very dark brown, or "warm slate black" as some authorities have it. The second is a lighter colored bird, with the mantle much more brownish, or a "warm slate gray"; while *frontalis* is much lighter yet, and has the mantle of a dark mouse gray which, in fresh autumn plumage, shows very little trace of brown. In this last race the head and crest are of a bluish black that contrasts quite strongly with the mouse gray of the back, the contrast being much greater here than in either of the other two races. One of the distinguishing characteristics of *frontalis* is this bluish wash that pervades not only the black of the head, but all of the darker parts.

On specimens taken at Requa, Del Norte County, California, in fresh plumage (September) there is a barely perceptible tinge of brownish to the dark bluish slate, or mouse gray, of the mantle, or to the (almost) black of the head and crest; whereas on specimens from the same locality taken in May, the tinge of brownish, while still slight, is very easily discernible, but it is not the same brown as that of *carbonacea*. It is a much lighter brown, and towards fall the old worn feathers become a grayish brown.

As compared with birds from Requa, autumn specimens taken progressively farther south along the coast show a lighter slate on the back and less depth in the black of the head, but the bluish wash is distinctly present. The gray on the throats of these northwest coast birds is lighter and the area covered by it is much more extended than it is in *carbonacea*, it being very similar in these particulars to that of *frontalis*.

The blue of the underparts of all the races of *Cyanocitta* varies a great deal with individuals. Some of the Requa birds tend strongly toward the blue of *frontalis* while others are of darker hue, but, even with these of darkest blue, the rump is lighter than that of *stelleri* or even of *carbonacea*. In these northwest coast specimens secured by us, the blue frontal spots are very conspicuous in nearly all of the adult birds, very much like the "blue *fronts*" of *frontalis*, and on the average much more conspicuous and extended than they are with *carbonacea*. This character is much restricted in *stelleri*.

One of the difficulties in making the differences in coloration clear to the reader is due to the variety of definitions given by different authors to the colors of the parts of the various subspecies of this jay. For instance, in four of our leading publications which are recent enough to consult for the purpose, the color of the back and scapular region in the case of the Steller Jay is given as follows: "deep black, or brownish black", "dark sooty brown", "fore parts of body dull blackish", and "sooty brown"; while Dr. Fisher, in the CONDOR article already quoted, calls it "warm slate black". This last description is to my mind the most suitable, if Ridgway's Nomenclature of Colors is used as the basis of comparison. Again, the second and third of the above authorities, in the same order, give these parts of the Coast Jay as, "slaty brown or brownish slate", and "back warm slate gray"; while Fisher gives the color as "warm slate gray", with which I do not so readily agree. In the case of the Blue-fronted Jay the colors run as follows: "brownish slaty", "hair brown, broccoli brown or drab", "fore parts of body brownish slate", and "similar to No. 487 (*stelleri*) but back paler"; while Fisher calls it "mouse gray", which seems to me to be correct.

Dr. Fisher made a trip to the northwest coast of this state in 1899, and, in a paper published soon after, stated that the jay of the Humboldt Bay region was typical *carbonacea*, both in summer and winter (Condor, 1902, p. 133). Now, if Dr. Fisher was correct in this diagnosis, at what point on the coast, between the Blue-fronted Jay habitat in Sonoma County, and Humboldt Bay, did the latter form give way again to the Coast Jay? Between the mouth of the Russian River, in Sonoma County, now known to be inhabited by the Blue-fronted Jay, and Humboldt Bay, there are no non-coniferous areas of any size, none large enough to make a barrier against this genus. The character of all this coast stretch—the nature of the association, and the climate—is practically the same throughout, differing only in degree. This being the case, where and why would the Blue-fronted Jay, which inhabits a cross-section of the state in all suitable localities, straight east from the mouth of the Russian River to the Sierras, merge into the Coast Jay to the northward? Or, why should the Coast Jay interpolate itself into the realm of the Blue-fronted in such a leap-frog fashion.

Opportunity presented itself for a visit to Eureka in June, 1916, and during my stay there several specimens of the jay were obtained from the Humboldt Bay region. The plumage of the birds taken at that season of the year was poor for comparisons, but I remarked at the time upon the light coloration of these specimens as compared with Coast Jays from the central coast district (Condor, XVIII, 1916, p. 199), and called attention to a certain similarity between them and specimens from Sonoma County, which latter have since been acknowledged to be good *frontalis*. However, not enough evidence had yet been brought to bear upon the points involved, and but little interest in the matter had so far been

aroused for the reason that no one else questioned the dictum of the authorities, who had stated that the Coast Jay occupied the Humid Coast Belt in California from the Santa Lucia Mountains, in southern Monterey County, north to the Oregon line.

As no further light upon this subject seemed to be forthcoming, and as this sort of work could be combined with other interests in the same line, it was decided to map out the field work of the Department of Ornithology of the California Academy of Sciences for the year 1921 so as to cover this northwest coast region and decide the matter definitely. This field party comprised two members, Mr. Chase Littlejohn, assistant curator, and myself for the spring work, with Mr. Chester C. Lamb temporarily taking Mr. Littlejohn's place for the fall work.

Breeding specimens of the crested jay were obtained at Patrick's Hotel and at Requa, Del Norte County, the former place being situated in the mountains about twenty or twenty-five miles in a straight line from the ocean, and the latter at the mouth of the Klamath River, practically on the ocean; while a few were also secured at Myer's Ranch, Humboldt County, probably eighteen miles inland, during the spring work. Every one of the specimens so obtained showed a closer approach to the Blue-fronted than to the Coast Jay! Yet it was difficult to say what dates of capture of the spring birds of the northwest coast would correspond with those of specimens from the central coast region so that the comparison might be a just one, since the northern season is so much colder and later than that of the central area.

To overcome this element of doubt, the fall trip was made over practically the same ground, but specimens were collected in more places, these being from north to south as follows: Requa, Del Norte County; Kneeland Prairie (16 miles in bee line east of Humboldt Bay), Petrolia (5 or 6 miles from the ocean), Thorn (same distance inland), all in Humboldt County; and Cummings (over 20 miles inland), Mendocino County.

The birds from all these places are in fresh new plumage, in the best possible state for comparison with birds in similar plumage elsewhere. The spring birds, taken in the third week in May, from Patrick's Creek, are practically *frontalis*, somewhat darker than typical specimens of this race, but as near typical as are many other specimens that are unquestionably placed with *frontalis*. Patrick's Creek is a tributary of Smith River, and the coniferous forest covering the canyons of these streams is thus directly connected with that of the sea-coast, with no break of any magnitude in the way of country unsuited to this jay.

In April and May a good series of jays was obtained at Requa, and they proved to be darker than any taken south of that point; but the decidedly brownish tinge of the crest, head, neck and back of the Coast Jay is not noticeable in those parts of the spring birds from Requa when compared with the former. In these latter birds there seems to be a slight brownish cast when they are looked at by themselves, but this disappears on comparison with *carbonacea*, when the resulting contrast makes the head of the Requa birds look black, or slaty black. The crest feathers of the Requa birds seem to match the Black or Slate Black of Ridgway's Nomenclature of Colors more nearly than they do any of the other combinations or hues.

The back of the northwest coast jays appears to be nearer to the Dark

Mouse Gray of Ridgway's Nomenclature of Colors than to anything else, thus according with Dr. Fisher's description of the back of *frontalis*, in which he states positively that the back is "mouse gray", while he gives the back of *carbonacea* as "warm slate gray". In these northwest coast jays there is the distinct blue wash over the darker parts, when viewed in the right light, and in none of these does the dark mantle extend as far posteriorly as it does in *carbonacea* and *stelleri*, but shades more rapidly into the blue of the lower back and rump, as is the case with typical *frontalis*. What slight brownish tinge there may be on some specimens of these coast birds is mostly confined to the scapular region. The blue of the lower parts of the Requa birds is decidedly darker than that of any of the specimens secured farther south, that is to say, farther south than Humboldt Bay, and below. We did not have an opportunity to secure any jays between Requa and Humboldt Bay. These should show some gradation in regard to this darker coloration.

The jays taken in the end of September and beginning of October at Kneeland, Petrolia, and Thorn, were all of a rather lighter shade than those from Requa, but were all of the same general tone of coloration. Placing one of these alongside a bird of corresponding date from the San Francisco Bay region brought out the difference in a most convincing manner. A friend, whose artistic line of business calls for a keen appreciation of colors, was asked to examine the different jays here concerned and to give an unbiased opinion as to the correctness of my diagnosis of their color schemes. With absolutely no knowledge of birds, this friend without hesitation picked out the northwest coast birds from those of the central coast and placed them with the *frontalis*, as being most closely allied to that form, and secondarily with *stelleri*. This was done, of course, without looking at the labels, and was a strong confirmation of my diagnosis.

Recently I had the pleasure of going over with Dr. Fisher, the series of seventy-eight specimens of *Cyanocitta* secured during the Academy field work along the northwestern California coast in 1921, and directing his attention to the points I am endeavoring to bring out in this paper. He was greatly interested in the matter, and finally decided that he had not had sufficient material, nor a sufficiently extended knowledge of conditions pertaining to the subject at the time of writing his paper already referred to, upon the status of these jays, to do the subject full justice.

CONCLUSIONS

As a result of our work in the field, and of the examination of a large number of specimens (from the Museum of Vertebrate Zoology, University of California, from the Mailliard collection, and from that of the California Academy of Sciences), I have arrived at the conclusion that the crested jay along the northwest coast of California commences with the nearly typical Blue-fronted Jay (*Cyanocitta stelleri frontalis*) in the vicinity of Freestone, Sonoma County, just north of the open non-coniferous country that extends east from Tomales Bay to the Napa Valley; that toward the north along the coast these birds grow gradually darker, the darkest California specimens being found in the county of Del Norte in the northwest corner of the state; that this darkness increases northward along the Oregon and Washington coasts until merged into typical *stelleri*; that toward the interior of California, corresponding to the decrease of humidity

and increase of light, the northwest coast birds gradually revert to *frontalis* proper; and that most of the intermediates from the northern interior of this state are intermediate with *stelleri* and *not* with *carbonacea*. In northern Oregon and in Washington they are probably intermediate with *annectens*.

A specimen from central Oregon, taken at Bend, on the Deschutes River, by Alexander Walker, is recorded in the Condor, XIX, 1917, p. 137, as having been identified by Dr. H. C. Oberholser as *carbonacea*. This diagnosis does not fit in with this idea just set forth, but I have not seen the specimen in question and can not give any opinion upon it other than to suggest that it may be one of those indefinite individuals that are sometimes met with and which are very difficult to place.

While there appears to be some slight gradation between the Coast Jay, from south of the open stretch each of Tomales Bay to Napa Valley, with the Blue-fronted Jay, found just north of that region, such intermediates seem to be rather rare, less than half a dozen of the specimens examined showing indication of it. This open country is only some twenty miles across, but it seems to make a very effective barrier against the intermingling of these two races. In fact the above examples of supposed intergradation may be only cases of individual variation.

Toward the southern end of the habitat of the Coast Jay in Monterey County, however, we know that there is extensive intergradation, as proved by many specimens examined, with a gradual merging into the Blue-fronted Jay toward the interior and farther south.

Many geologists believe that at one time in the geological history of this coast an insular condition existed in that portion of it extending from Mt. Tamalpais, just north of San Francisco Bay, as far south as Monterey Bay, and that this territory was shut off by water from the interior. From Tomales Bay north, however, there seems to be no evidence of similar conditions having prevailed in any of that part of the coast of California.

Cyanocitta stelleri carbonacea now occupies the portion of the central California coast that was supposed at one time to be either an island, or a group of islands not widely separated. If this were the case, why not suppose that the genus *Cyanocitta* originally occupied the interior mountains of the state and spread toward the coast from there? Then, when the central coast subsided so as to bring about an insular condition, why not assume the hypothesis that this subsidence was of sufficiently long duration to evolve the race of *carbonacea* to suit the prevailing conditions; or, in other words, why may not *carbonacea* have been at one time an insular form?

California Academy of Sciences, San Francisco, April 3, 1922.

FROM FIELD AND STUDY

The Arizona Crested Flycatcher as a Bird of California.—On May 17, 1921, Mrs. May Canfield collected two Arizona Crested Flycatchers (*Myiarchus magister magister*) in the bottomlands of the Colorado River, near Bard, Imperial County, California. These specimens which are now numbered J 1071 and J 1072 in my collection, are of particular interest, since they constitute the first record of the appearance and capture of this species in California.

In connection with this record, it is of interest to note that the birds were collected in an indigenous willow-cottonwood association bordering cultivated fields. Too much stress must not be placed, however, upon the difference between this environment and the giant cactus association in which Mr. H. S. Swarth (Pacific Coast Avifauna, no. 10, 1914, pp. 40-41) found these birds nesting in southeastern Arizona, and to which he considered the species restricted, at least in that section. The date of the present capture is a dangerous one to conjure with when the breeding or migrational status of a species is in question. There are isolated groves of this same sahuaro cactus (*Cereus giganteus*) only a few miles distant from our California record station. In the migration of many species, the males precede the females. The collection of two males, instead of a mated pair, may therefore well suggest the probability that these birds were simply on the move to nesting sites in the sahuaros, a bit farther to the north.

From Mr. Swarth's experience, and from our own, it is perhaps permissible to predict that the range of this species will ultimately prove to be delimited in California by the northern and western outposts of this cactus within our borders. The foothold of the sahuaro in California is admittedly precarious. If the summer range of *magister* should be found to be coincident with the distribution of this cactus, and if the latter should be extirpated by the agency of man, or otherwise, it would be interesting to note, as the years go by, whether the flycatcher in question has sufficient associational plasticity to adapt itself to the changed ecological condition, or whether it would retreat, in that event, to the sahuaros of Arizona.—DONALD R. DICKEY, *Pasadena, California, April 25, 1922.*

Occurrence of the Surf Scoter on Fresh Water.—A neighbor shot five Surf Scoters (*Oidemia perspicillata*) April 5, 1922, on a small pond at the head of his irrigating ditch at the lower end of La Puerta Valley, San Diego County, California; altitude 2100 feet. One was a male, the other four females. The male was given me and I preserved the skin (now no. 43202, Mus. Vert. Zool.). I think this is the first fresh-water record for this species for California.—FRANK STEPHENS, *San Diego, California, April 10, 1922.*

The Salt Marsh Yellowthroat in Southern California.—Some months ago, when Mr. Donald R. Dickey and the writer had occasion to work over a series of Yellowthroats (*Geothlypis trichas*) taken in the salt marsh area about Anaheim Bay, Orange County, California, it was found that two forms were present. Most of the birds were readily referable to the fresh water resident, *scirpicola*, but nine dark, small specimens seemed to belong to the San Francisco Bay race, *sinuosa*. Three of the latter were sent to Mr. H. S. Swarth, of the Museum of Vertebrate Zoology, who pronounced them representative of that form. He also suggested that breeding yellowthroats from the southern California salt marshes be collected in order to determine their exact status.

Accordingly, on April 21, 1922, I took, at Hog Island, Anaheim Bay, Orange County, three males in breeding condition, and a female carrying nesting material. These are found to be not quite typical of, but may be safely called, *scirpicola*. The extreme dates for the occurrence of *sinuosa* in this region are October 3 to March 15, so that it evidently occurs as a spring and fall migrant as well as a winter visitant. Under the circumstances, the appearance of *sinuosa* in the salt marshes of southern California indicates that this form is, to a degree at least, migratory, and not the hard and fast "resident" of the San Francisco Bay region, which it was previously supposed to be.—A. J. VAN ROSSEM, *Los Angeles, California, May 23, 1922.*

A Second Capture of the Broad-tailed Hummingbird in California.—One of the interesting results of field work carried on by Mr. Laurence M. Huey in the White Mountains during the past summer and fall was the taking of an immature male Broad-tailed Hummingbird (*Selasphorus platycercus*) in fresh post-juvenal plumage. This specimen was collected at an altitude of 9000 feet, on Cottonwood Creek, White Mountains, Mono County, California, August 23, 1921, and is now number J 1590 of my collection.

As early as May, 1912, Mr. H. S. Swarth, while engaged in field work in the Inyo Mountains for the Museum of Vertebrate Zoology, detected the presence of this species within the confines of our State, and later recorded his experience (Condor, XVIII, 1916, p. 130). His sight record and the accompanying prognostication were later confirmed by the taking of a female and two young in the White Mountains by another field party of the same Museum. In commenting on the taking of these first actual specimens in California, Dr. Joseph Grinnell (Condor, XX, 1918, p. 87) states that "the indications are that this Rocky Mountain species of hummingbird occurs regularly as a summer visitant to the high mountains along the eastern border of California, east of Owens Valley". The second capture, presented herewith, is merely additional proof that the earlier suppositions were amply justified, and that *Selasphorus platycercus* does occur regularly, if rarely, in the desert ranges of east-central California.—DONALD R. DICKEY, *Pasadena, California, April 25, 1922.*

An Unknown Near San Diego.—For the previous two winters a Green-tailed Towhee (*Oreospiza chlorura*) had frequented our back yard and fed from the bird-table there. This past winter I had been on the look-out for it to appear again. The first week in February I had several times caught a glimpse of a bird with some green on it flying away. I expected to recognize the towhee when I could get a good view of it.

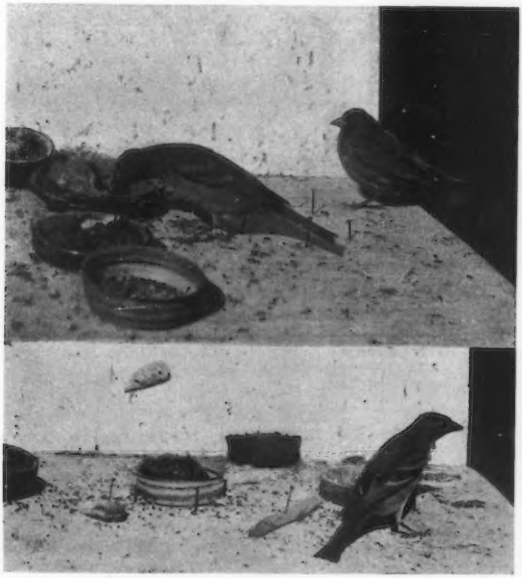

Fig. 34. TWO VIEWS OF AN UNKNOWN BIRD WHICH VISITED A FEEDING-TABLE NEAR SAN DIEGO, CALIFORNIA, IN FEBRUARY, MARCH AND APRIL, 1922. THE LINNET ALSO SHOWN FURNISHES A STANDARD OF COMPARISON.

This opportunity occurred on February 12, but instead of being a towhee it was a very different bird. Its general appearance was very like that of the female Arizona Hooded Oriole, a trifle smaller and more stockily built.

The shapes of the head and bill were quite different from those of the oriole. The bill was an orange yellow, rather brighter than that of the white-crowned sparrow. In size the bill was between that of the grosbeak and that of the oriole. The lower photograph (fig. 34) shows the shape admirably. The eye was prominent and bead-like. The upper parts of the bird were greenish, brightest on the head and rump, back washed with grayish, wings and tail brownish. The under parts were more or less yellow, brightest on throat and rump, whitish in middle. It had two white wing-bars, and later the tertials were slightly tipped with white.

It came regularly to the feeding table from one to a dozen times a day, from February 12 to April 10. Have not seen it since April 10. During those two months there were not more than three days in which I did not see it. It may have come without having been seen.

The table was ten or twelve feet from my window. Each morning I put a small quantity of bird-seed, some cracker crumbs, either a spoonful of canned fruit or a cut orange, and occasionally some suet on the table. I never saw this bird touch anything but the fruit; and it seemed to prefer the canned figs to any other fruit. It ate of the fruit voraciously, coming every half-hour or so as long the daily ration lasted. I did not hear it make a sound until a short time before it left and that was a very odd sound of several syllables that I cannot describe.

The bird was rather shy, especially when the camera was set up near the table, or when I used an opera glass at the window. At other times it did not much mind being looked at. There was no red in the plumage and no yellow on the wings. Its bill was much lighter in color than are the bills of the tanagers in the museum. If it had been two months later I should have called it a Western Tanager without question.

My record of the visits of the Western Tanager (*Piranga ludoviciana*) is as follows: 1908—May 11 to May 15; 1912—April 23 to May 8; 1918—May 4; 1921—May 6 to May 29; 1922—May 12.

If not a Western Tanager what was my unknown bird?—Mrs. T. F. JOHNSON, *National City, California, May 29, 1922.*

Swamp Sparrow Recorded from California.—On their return from a collecting trip in the White Mountains of California this past fall, Mrs. May Canfield and Laurence M. Huey stopped at various stations to collect series of the local mammals and birds of east-central California. While camped near Keeler, Inyo County, California, on November 1, 1921, a strange sparrow came to a little spring near the camp. The bird was collected and proved to be a Swamp Sparrow (*Melospiza georgiana*). This specimen is number J 1797 of my collection, and constitutes another addition to the California list.

In commenting on the specimen, Dr. Joseph Grinnell calls my attention to its agreement in wing length with middle-western birds, from Illinois, rather than with Atlantic slope representatives of the species, as a rough indication of the source of this straggler.

The bird has been recognized as a regular summer resident west as far as west-central Alberta (*A. O. U. Check-List*, 3d. ed., 1910, p. 276), but a distinct south-eastern trend of fall migration has been indicated, due no doubt to the barrier of the Rocky Mountains. That the bird occasionally straggles over these mountains far to the south and west is shown both by Howell's Arizona specimen (Condor, XVIII, 1916, p. 213) and by the present California record.—DONALD R. DICKEY, *Pasadena, California, May 4, 1922.*

Nesting of the California Evening Grosbeak.—On June 14, 1914, W. W. Moore and myself found a California Evening Grosbeak (*Hesperiphona vespertina californica*). Just out of the town limits of Eureka, in a patch of green timber bordered on the lower end by a salt marsh, we were attracted by the loud whistling and scolding notes of the bird. When we were able to locate the noise, we found four birds feeding in the top branches of a white fir. The light being right we could easily distinguish the two males

from the two females. The noisy bird proved to be a male and seemed to have a quarrel with one of the females. He would stop all his racket and go to feeding; suddenly he would start scolding, drive the female from her feeding place, stop scolding and go to feeding there himself. We saw him do this several times before we left to see what was in a nest of a Black-headed Grosbeak nearby.

From there we went in search of a Western Winter Wren's nest, without success. All of this time we could hear that noisy male Evening Grosbeak at intervals. So back we went, to where the grosbeaks were feeding. We were back several minutes before the quiet male and female flew to another part of the timber. This seemed to set the noisy male agoing; he drove the female across several trees before she disappeared in a thick cluster of small branches near the top of a white fir. The male landed about twenty feet lower down, in the same tree, and all his racket stopped. In a short while he flew in the direction taken by the other pair, and was not followed by the female.

Up the tree I went and was within twenty feet from where the female disappeared when Moore called, "there she goes", and down she came to meet me. Up to the cluster of branches I went; there was the nest, placed in a crotch formed by two branches crossing, and was within reaching distance. The nest was made of dry twigs, that looked as if they were broken by the birds from a near-by dead fir. It was thickly lined with fine dry roots.

The nest contained four eggs, incubation from just right to nearly hatching. The eggs look like Red-winged Blackbirds', and the extremes measured in inches .50 to .64 by .37 to .98. All the time I was at the nest, the female made all the racket the male had previously made, besides snapping her beak. Her scolding must have been heard for quite a distance, but the male did not return.—JOHN M. DAVIS, *Eureka, California, March 30, 1922.*

The Gray Flycatcher in the White Mountains of California.—The appearance of the Gray Flycatcher (*Empidonax griseus*) in southern California in migration and in winter, and its disappearance during the breeding season, has for many years been a problem for which there seemed no logical solution. Until recently, there has been no basis of data which would serve to trace its movements in California, after it passes through the San Diegan district as a common spring migrant. However, the recently published records by Oberholser, of the summer occurrence of *griseus* in Nevada (Auk, XXXVII, *1920*, p. *133*), and in eastern Oregon (Condor, XXII, 1920, p. 37), coupled with the specimens recorded below, seem to shed a little light on the subject. There are, in the Dickey collection, four specimens of this flycatcher, taken by Laurence M. Huey and Mrs. May Canfield, in the White Mountains of east-central California. Three of these are nearly full grown juveniles, two of which were taken at McCloud Camp, Mono County, at an altitude of 10,000 feet, August 27, and the third on Wyman Creek, Inyo County, at 8000 feet, September 4. The fourth is also a juvenile, just coming into first fall plumage, and was collected on Wyman Creek, at 8000 feet, on September 3, 1921. The inference is that these birds were hatched somewhere in the vicinity, for scarcely-grown juveniles would hardly have undertaken any extensive wandering.

It would therefore seem that the Gray Flycatcher, after leaving the San Diegan district, passes north-eastward to the desert ranges to breed. The fact that this region has been but sparingly worked by collectors, accounts, in our belief, for the present scarcity of summer records. These remarks have, of course, nothing to do with the individuals of this species which breed in Lower California, but they do apparently solve the seeming vagaries of movement in the California population of *griseus*.—D. R. DICKEY and A. J. VAN ROSSEM, *Pasadena, California, May 30, 1922.*

A Third Record of the Gray-headed Junco in California.—The first records of an unexpected bird in any arbitrary geographic area are necessarily so casual in their very nature as to suggest the advisability of publishing further confirmatory notes. Dr. Joseph Grinnell (Pasadena Acad. Sci., Pub. 2, 1898, p. 38), and Mr. Austin Paul Smith (Condor, IX, 1907, p. 199) have already called attention to the occasional presence of *Junco caniceps* in California. Recent experience leads the writer to believe that this species is a more regular winter visitant to California than the previous records suggest.

During the past winter and spring, Mr. A. J. van Rossem had occasion to make several week-end trips to Oak Glen, situated at the head of the Yucaipa Valley, at an altitude of 5200 feet, in the San Bernardino Mountains, California. Careful scrutiny of the flocks of juncos which frequented the vicinity disclosed two individuals of the Rocky Mountain species, *Junco caniceps*. These specimens (nos. K 75 and K 76, coll. D. R. D.) were collected by van Rossem on March 4, 1922, and thus confirm the field determination.

The heavy rains which the West enjoyed during the winter months of 1921-1922, with the consequent heavy snowfall in the higher altitudes, naturally restricted the winter range of these ground-feeding birds which are, in all probability, normally present in the mountains of southern California during the winter months. It is the writer's belief, based on this data, that *caniceps* would be found a regular—though possibly rare—winter visitant to California, if equally favorable opportunities for observation were afforded each winter. The lack of mountain collecting in the winter months, and the rarity of similar snow conditions, have in all probability accounted for the previous dearth of California records of this species.—DONALD R. DICKEY, *Pasadena, California, May 30, 1922.*

RECORD OF BIRDS BANDED

Bands: 5701-5708 6612-6650 9726-9730 12336-12344 12346-12368 24801-24805 24807-24835 32885-32889 32891 56433

J. E. Law, at Los Angeles, Calif., November 28, 1921, to May 26, 1922.

Carpodacus m. frontalis, (22) 6615,-17, -29, -41, -42, 6647-6650, 12352, 12359-12361, 24810, -13, -15, 24817-24822.
Dendroica a. auduboni, (1) 6622.
Melospiza m. cooperi, (4) 6619, 24830, 48129, -30.
Mimus p. leucopterus, (1) 32886.
Pipilo c. senicula, (1) 32885.
Zonotrichia coronata, (1) 6626.
Zonotrichia leucophrys (subsp.), (48) 6612, -14, -16, -18, -20, -21, -23, -24, -25, -27, -28, 6630-6637, 6643, -46, 12341, -42, -50, -51, -53, -54, -55, -56, -58, 12362-12368, 24804, -09, -11, -12, -23, -24.

At Altadena, Calif., December 7, 1921, to May 30, 1922.

Chamaea f. henshawi, (5) 6639, 24805, -07, -08, -14.
Cinclus m. unicolor, (1) 56433.
Hylocichla guttata (subsp.), (2), 6638, 12357.
Junco o. thurberi, (1) 12344.
Mimus p. leucopterus, (1) 12348.
Pipilo c. senicula, (5) 12346, -47, 32888, -89, -91.
Pipilo m. megalonyx, (2) 12343, -49.
Thryomanes b. charienturus, (5) 24831-24835.
Toxostoma r. redivivum, (5) 9726-9730.
Zonotrichia coronata, (13) 6613, -40, -44, -45, 24801, -02, -03, -16, 24825-24829.

Ernest P. Walker, at Beardslee Island, Glacier Bay, Alaska, August 3, 1921.

Larus glaucescens, (3) 5701-5703.

At South Marble Island, Glacier Bay, Alaska, August 5, 1921.

Larus glaucescens, (5) 5704-5708.

EDITORIAL NOTES AND NEWS

The annual Cooper Club roster appearing in the present issue of THE CONDOR, shows a total membership of 800. This is a six per-cent increase over last year, and, of course, is larger than ever before. For the compilation of this directory, which experience has shown to be a very useful feature of our annual volume, the Club is indebted to Mrs. J. Eugene Law.

The best index to current ornithological literature in the world today, we believe, is that comprised in the "Recent Literature" department of *The Auk*. The editor of this journal, Dr. Witmer Stone, with the advantage of the excellent literary facilities at the Academy of Natural Sciences of Philadelphia, has proven himself able to cover the literature of every country with remarkable thoroughness. Rarely does a title come to light which he has missed. Especially useful is it to have a clue to articles

which are widely scattered, often effectively hidden, in various publications other than the regular ornithological journals.

Ornithological work we happen to know to be in progress relative to western North America includes the following: By Joseph Mailliard, further studies on the local migrations and distribution of birds in the northwest coast district of California; by Walter P. Taylor and Prof. W. T. Shaw, the distribution and habits of the birds of Washington; by Joseph Grinnell and Tracy I. Storer, the natural history of Yosemite birds; by Allan Brooks and Harry S. Swarth, the distribution and systematic status of the birds of British Columbia; by Donald R. Dickey and A. J. van Rossem, the systematic status of various birds of southern California; by J. Eugene Law, the birds of the Chiricahua Mountains, Arizona; by Loye H. Miller, the fossil birds of the McKittrick asphalt deposits; by Joseph Grinnell, the birds of Death Valley.

An editorial in the Berkeley "Gazette" for April 24, 1922, is so good, the points made appeal to us as so well taken, that we give the gist of it here. "The Department of Agriculture is now experimenting with various kinds of gas as a means of destroying noxious insects, mammals and birds. . . . A test is to be made, probably with chlorine, on the destructive blackbirds of the Imperial Valley. The plan is to overwhelm them with a gas cloud at night while they are roosting in the marshes. Other plans contemplate the slaughter of grasshoppers, locusts, etc., by similar clouds, used precisely as the gas was used against hostile armies. It is a hopeful adaptation of destructive weapons to constructive purpose, but one to be used with extreme caution. Aside from the danger to the wielder of the weapon, there is the same objection to gas in peace as in war—it is likely to kill noncombatants along with enemies. This is true alike of mammals, birds and insects. The gas may annihilate them all, the beneficent along with the rest, and often it is difficult to say in which class any particular creature belongs. Many a well-meant effort at riddance of a pest has brought a worse evil, by interfering ignorantly with the fine balance of nature. Any farmer contemplating a gas-cloud assault along his crop front had better wait until the experimenting has gone farther."

Everyone who has any sympathetic regard for the sport of bird photography should see the illustrated article by Robert B. Rockwell and Clark Blickensderfer, in *Natural History* (American Museum of Natural History, New York, xxi, 1921, pp. 626-638). Remarkable success was won by these men in picturing the home life of the elusive Saw-whet Owl in the mountains of Colorado. The eighteen excellent photographs published with the article betoken a degree of patience and skill that only a person who has made attempts along similar lines can fully appreciate.

PUBLICATIONS REVIEWED

PHILIPPINE BIRDS FOR BOYS AND GIRLS. By Richard C. McGregor and Elizabeth J. Marshall; with illustrations by Macario Ligaya. Manila (Bureau of Printing), pp. 1-138, many plates (colored) and text figures.

Thirty presumably common species of Philippine birds are treated in brief chapters, giving for each certain outstanding features of its life history. The book is written "for boys and girls", as indicated by the title, and apparently for very small boys and girls. Brief appendices giving additional information regarding the birds described, and with references to bird literature, will be valuable to teachers using the volume as a text book. This is a new departure for the senior author, in rather startling contrast to the technical articles with which we are used to associate his name. It brings to the mind one feature of a cartoon that appeared in THE CONDOR of March, 1901.—H. S. SWARTH.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

APRIL.—The regular meeting of the Northern Division of the Cooper Ornithological Club was held at the Museum of Vertebrate Zoology on April 27, 1922, at 8 P. M. President Swarth was in the chair, and the following members were present: Mesdames Allen, Bennet, Blake, Bogle, Culver, Davenport, Flinn, Grinnell, Mead, Reygadas, Thomson and Van Gaasbeek; Messrs. Bell, Dixon, Evermann, Grinnell, Willard Grinnell, Mailliard, Miller, Storer, Strong, Torrey and White. Among the visitors were Mrs. Evermann, Mr. and Mrs. Hagedoorn, Mrs. Thomson and Prof. Kingsley.

After the reading and approval of the March minutes, the minutes of the Southern Division for February and March were read. Mr. Vernon L. Tenney, 2536 Etna Street, Berkeley, was proposed for membership by Dr. William F. Bade.

Professor Kingsley then gave an account of naturalists he had known, using photographs for illustrative material. Adjourned. —AMELIA S. ALLEN, *Secretary*.

SOUTHERN DIVISION

MARCH.—Regular monthly meeting of Cooper Ornithological Club, Southern Division, was held at 8:00 P. M. at the usual place. Dr. Rich was in the chair, and in the absence of the regular secretary he appointed Mr. Little secretary pro tem. Others present were as follows: Mrs. Law; Miss Miller and Miss Pratt; Messrs. Appleton, Bishop, Brown, Chambers, Hannaford, Holland, Howell, King, Lamb, Law, Miller, Nokes and van Rossem. Visitors were: Mesdames Bishop, Howell and Raymond, and Miss Swarth.

Minutes of January and February meetings were read and approved. Membership applications were as follows: Dr. George T. McKeough, Blenkerin, Ontario, Canada; John D. Houghton, care Dr. J. W. Flinn, Prescott, Arizona; Harry H. Sheldon, care Commercial Trust & Savings Bank, Santa Barbara; and Hamilton Gamble, 476 8th Ave., San Francisco, all by W. Lee Chambers; David L. MacKaye, Tulare, Calif., by L. E. Wyman. From the Northern Division came the following: Mrs. W. S. Davenport, Berkeley; Philip Kloss, Piedmont; and Mrs. Adeline Frederick, Berkeley.

Dr. Miller then presented an interesting paper on "Recent Things on Fossil Birds". The peculiar relations, in wing markings, of the Glaucous-winged and Thayer Gulls were demonstrated and discussed by Dr. Bishop. The meeting closed with the usual informal discussion of subjects ornithological. Adjourned.—LUTHER LITTLE, *Secretary pro tem.*

DIRECTORY OF MEMBERS OF THE COOPER ORNITHOLOGICAL CLUB

Revised to June 1, 1922

OFFICERS

NORTHERN DIVISION

President, Harry S. Swarth
Vice-President, J. S. Cooper
Secretary, Mrs. Amelia S. Allen

SOUTHERN DIVISION

President, Guy C. Rich
Vice-President, Wright M. Pierce
Secretary, L. E. Wyman

EDITORS

Joseph Grinnell
Harry S. Swarth

BUSINESS MANAGERS

J. Eugene Law
W. Lee Chambers

ENDOWMENT SECRETARY

A. Brazier Howell

The above officers, together with the following ex-presidents (not included above, all those whose membership has been continuous since incumbency) constitute the Board of Governors of the Club.

Ralph Arnold, Harold C. Bryant, Henry W. Carriger, Herbert L. Coggins, Barton Warren Evermann, Walter K. Fisher, Ozra W. Howard, Joseph Mailliard, Loye H. Miller, G. Frean Morcom, Wilfred H. Osgood, Howard Robertson, Tracy I. Storer.

MEMBERS

In the following roster, residence is understood to be in California unless otherwise indicated. Year following address indicates date that member joined the Club; year in parenthesis indicates date member became honorary or life member. Star (*) preceding indicates life member; "§" indicates contributor to Endowment Fund.

HONORARY MEMBERS

*§Bailey, Florence M. (Mrs. Vernon), 1834 Kalorama Road, Washington, D. C. 1910 (1920).
Henshaw, H. W., Biol. Survey, Washington, D. C. 1909.
Merriam, Dr. C. Hart, 1919 16th St., Washington, D. C. 1909.
Nelson, E. W., Biol. Survey, Washington, D. C. 1904 (1917).
Ridgway, Robert, 3306 New Hampshire Ave., N. W., Washington, D. C. 1905.
§Stephens, Frank, 3746 Park Blvd., San Diego. 1894 (1912).

ACTIVE MEMBERS

Abbott, Clinton G., Nat. Hist. Museum, Balboa Park, San Diego. 1921.
Abernathy, Frieda (Mrs. St. E.), 2300 Durant Ave., Berkeley. 1914.
Adams, Benjamin, Wethersfield, Conn. 1920.
Adams, Miss Romola M., 912 Linden Ave., Long Beach. 1921.
Alexander, Miss Annie M., Suisun. 1908.
Alexander, E. Gordon, 1603 South St., Lexington, Mo. 1918.
Allen, Dr. Arthur A., McGraw Hall, Ithaca, N. Y. 1911.
Allen, Mrs. Amelia S., 37 Mosswood Road, Berkeley. 1913.
Anderson, Mrs. Malcolm P., 2809 Buena Vista Way, Berkeley. 1920.
Anderson, Dr. Rudolph M., Biol. Div., Victoria Memorial Museum, Ottawa, Ont., Canada. 1916.
Andrews, E. R., Apt. 14, 1048 Union St., San Francisco. 1920.
Anthony, A. W., Nat. Hist. Museum, Balboa Park, San Diego. 1921.
Applegate, Elmer I., Klamath Falls, Ore. 1921.

*Appleton, J. S., 1332 Citrus Ave., Hollywood. 1901 (1919).
Armstrong, Edward E., 2249 Calumet Ave., Chicago, Ill. 1914.
Arnold, E., Grand Trunk Ry., Montreal, Que., Canada. 1909.
Arnold, Mrs. Lewis, 2732 Benvenue Ave., Berkeley. 1921.
Arnold, Dr. Ralph, 639 S. Spring St., Los Angeles. 1893.
Arnold, Dr. W. W., 504 N. Nevada Ave., Colorado Springs, Colo. 1911.
Atkinson, W. L., 35 Hawthorne Way, San Jose. 1901.
Atsatt, Miss Sarah R., 345 S. Serrano Ave., Los Angeles. 1911.
Austin, Miss Dorothy K., 85 S. Madison Ave., Pasadena. 1921.
Averill, Charles Ketchum, 406 Stratford Ave., Bridgeport, Conn. 1922.
Ayer, Ethel C., 1301 Jackson St., Oakland. 1920.
Bacon, Brasher C., Madisonville, Ky. 1921.
Bade, Wm. F., 2616 College Ave., Berkeley. 1903.
Badger, M. C., Santa Paula. 1915.
Bailey, Alfred M., Colo. Museum Nat. Hist., Denver, Colo. 1917.
Bailey, Bernard, R.D. 1, Elk River, Minn. 1911.
Bailey, H. H., Box 5, Miami Beach, Miami, Fla. 1903.
Bailey, Vernon, 1834 Kalorama Road, Washington, D. C. 1904.
Baker, Chas. H., 594 13th St., Oakland. 1921.
*Baldwin, S. P., 2930 Prospect Ave., Cleveland, Ohio. 1920 (1920).
§Bales, Dr. B. R., 149 W. Main St., Circleville, Ohio. 1906.
Ballard, Mrs. Maria V., 295 12th St., Portland, Ore. 1919.
Bamford, Mrs. G. L., 1428 Castro St., Oakland. 1918.
Bancroft, Griffing, Cuyamaca Club, San Diego. 1920.
§Bangs, Outram, Museum Comp. Zool., Cambridge, Mass. 1906.
Barker, Fred, Parkers Prairie, Minn. 1914.
Barnes, C. A., 1815 S. Western Ave., Los Angeles. 1921.
Barnes, Claude T., 359 10th Ave., Salt Lake City, Utah. 1915.
Barnes, Frances V., 1815 S. Western Ave., Los Angeles. 1921.
*§Barnes, R. Magoon, Lacon, Ill. 1908 (1921).
Barrows, Prof. Walter B., Box 1047, East Lansing, Mich. 1909.
Bartlett, Mrs. Adelaide R., Assessors Office, City Hall, San Francisco. 1922.
Bassett, F. N., 1338 8th St., Alameda. 1919.
Batchelder, Chas. F., 7 Kirkland St., Cambridge, Mass. 1910.
Bates, Josephine J., 1267 Sunset Ave., Pasadena. 1921.
*§Beck, Rollo H., R.D. 21, San Jose. 1894 (1919).
Beers, Miss Catherine V., Univ. Southern Calif., Los Angeles. 1921.
Bell, Archibald W., 2423 Oregon St., Berkeley. 1922.
Bell, B. C., 235 8th St., San Francisco. 1919.
Benjamine, Elbert, 109 Coral St., Los Angeles. 1920.
Bennet, Eleanor V. V., 2904 Piedmont Ave., Berkeley. 1920.
Bennett, R. H., 216 Market St., San Francisco. 1909.
Bent, A. C., 140 High St., Taunton, Mass. 1909.
Benton, Thos. H., Jr., 3200 Liberty Ave., Alameda. 1916.
Bergtold, Dr. W. H., 1159 Race St., Denver, Colo. 1917.
Betterley, Bertram O., 2005 2nd St., Eureka. 1922.
Bicknell, Mrs. F. T., 319 S. Normandie Ave., Los Angeles. 1913.
Bigelow, Homer L., 37 Old Orchard Road, Chestnut Hill, Mass. 1910.
*Bishop, Dr. Louis B., 5956 Hollywood Blvd., Hollywood. 1904 (1920).
Blake, Mrs. Edwin T., 2233 Piedmont Ave., Berkeley. 1917.
Blayney, Nita A., 920 O St., Fresno. 1911.
Bliss, John D., Pozo, San Luis Obispo Co. 1916.
Boeing, W. E., The Highlands, R.D. 2, Seattle, Wash. 1914.
Bogle, Mrs. Sara S., 2520 Hillegass Ave., Berkeley. 1921.
Bolander, L. Ph., Jr., 1947 E. 28th St., Oakland. 1907.
Bolt, B. F., 1421 Prospect Ave., Kansas City, Mo. 1916.
Borell, Adrey E., 227 Calaveras Ave., Fresno. 1918.
Bowden, R. E., Bozeman, Mont. 1921.
Bowdish, B. S., Demarest, N. J. 1910.
Bowles, J. H., The Woodstock, Tacoma, Wash. 1903.
Boyle, Ashby D., 380 E St., Salt Lake City, Utah. 1915.
Boyle, Miss Una, 132 Laurel Place, San Rafael. 1921.
Boynton, Charles T., 1005 S. Sheridan Road, Highland Park, Ill. 1919.
*§Bradbury, W. C., 1440 Race St., Denver, Colo. 1913 (1914).

Braislin, Dr. William C., 425 Clinton Ave., Brooklyn, N. Y. 1910.
Bramkamp, Richard, Banning. 1921.
Brandt, H. W., 2025 E. 88th St., Cleveland, Ohio. 1914.
Bridges, Mrs. Harriette W., 5939 Shafter Ave., Oakland. 1918.
*Brooks, Allan, Okanagan Landing, B. C., Canada. 1906 (1920).
Brooks, L., Box 539, New Bedford, Mass. 1913.
Brouse, W. A., 3623 5th Ave., Los Angeles. 1916.
Brown, D. E., 87 Lenora St., Seattle, Wash. 1909.
*Brown, Edward J., 222 W. 47th Pl., Los Angeles. 1915.
Brown, G. Franklin, Needham, Mass. 1918.
Brown, Mrs. Herbert, 434 E. 2d St., Tucson, Ariz. 1914.
Brown, Miss Nellie M., 810 Brockman Bldg., Los Angeles. 1922.
Brown, Mrs. William C., 945 Orange St., Los Angeles. 1921.
Brownlee, Mrs. Marie P., 714 Grosse Bldg., Los Angeles. 1919.
Brune, Leo, Grand Dalles, Wash. 1919.
Bryan, William Alanson, Museum Hist., Sci., and Art, Los Angeles. 1921.
Bryant, Dr. Carl H., Atascadero. 1922.
Bryant, Chas. A., Room 1028 S. P. Bldg., 65 Market St., San Francisco. 1922.
§Bryant, Dr. Harold C., Museum Vert. Zool., Berkeley. 1910.
Buhn, Mrs. Minnie, 1025 Pearl St., Alameda. 1921.
Bull, Daniel Bernard, R.D. A, Box 158, San Jose. 1919.
Bull, Mrs. D. Bernard, R.D. A, Box 158, San Jose. 1921.
Bunker, Paul F., 1913 Woolsey St., Berkeley. 1922.
Burk, Genevieve S., 1601 Oxford St., Berkeley. 1920.
Burleigh, Thos. D., Univ. Ga., Athens, Ga. 1918.
Burnell, Miss Elizabeth, 419 S. Olive St., Los Angeles. 1921.
Burnett, W. L., State Agr. Coll., Fort Collins, Colo. 1910.
Burnham, Dr. Clark, Bushnell Place, Berkeley. 1907.
Burnham, John, Timken Bldg., San Diego. 1920.
Burns, Frank L., Berwyn, Pa. 1909.
Burns, James R., 645 44th St., Des Moines, Ia. 1922.
Burtch, Verdi, Branchport, N. Y. 1910.
Cahn, Alvin R., Biol. Dept., Texas A. and M. College, College Station, Tex. 1922.
Calder, James A., Buena Park. 1917.
Camp, Chas. L., Bacon Hall, Univ. Calif., Berkeley. 1909.
Canby, Caroline P., San Fernando. 1921.
Canfield, Mrs. May, 2875 Clay Ave., San Diego. 1922.
Cantwell, George G., Puyallup, Wash. 1915.
Carpenter, George I., 129 Dean St., Brooklyn, N. Y. 1920.
Carpenter, N. K., 3775 Kite St., San Diego. 1901.
Carriger, H. W., 5185 Trask St., Oakland. 1895.
Case, Rev. Bert F., East Granby, Conn. 1913.
Case, C. M., 306 Blue Hills Ave., Hartford, Conn. 1911.
Case, Walter M., Box 399, Prescott, Ariz. 1921.
§Chamberlain, C. W., 36 Lincoln St., Boston, Mass. 1912.
*Chambers, W. Lee, Eagle Rock. 1897 (1919).
Chapman, Frank M., Amer. Museum Nat. Hist., New York, N. Y. 1903.
Cheesman, M. R., R.D. 1, Rivera. 1919.
Cheney, E. S., 1838 4th Ave., Oakland. 1920.
Cheney, Miss Mary, South Manchester, Conn. 1919.
Clark, Josiah H., 702 E. 23d St., Paterson, N. J. 1910.
Cleaves, H. H., Nat. Hist. Museum, Balboa Park, San Diego. 1921.
Clifton, H. T., 509 E. Walnut St., Pasadena. 1904.
Coale, Henry K., Highland Park, Ill. 1907.
Coffin, Robert L., Mass. Agr. Exp. Station, Amherst, Mass. 1920.
Coggins, Herbert L., 2929 Piedmont Ave., Berkeley. 1910.
Cohen, Donald A., 2618 Lincoln St., Alameda. 1901.
*§Colburn, A. E., 806 S. Broadway, Los Angeles. 1905 (1915).
Cole, Mrs. Arthur H., 2827 Hillegass Ave., Berkeley. 1917.
Cole, F. R., Box 26, Palo Alto. 1919.
Cole, John L., R.D. 5, Nevada, Ia. 1922.
Coman, Mary C., 1644 Berkeley Ave., Stockton. 1921.
Compton, Mary J. (Mrs. C. Norman), 6510 1st St. N. E., Seattle, Wash. 1920.
Comstock, Dr. John, Southwest Museum, Los Angeles. 1920.
Cook, Fred'k. W., 1604 E. Harrison St., Seattle, Wash. 1919.
Cooke, Miss M. T., 1328 12th St., Washington, D. C. 1918.
Cookman, Alfred, 2921 B St., San Diego. 1912.
Cooley, R. A., Agr. Exp. Sta., Bozeman, Mont. 1921.

Cooper, J. S., 827 54th St., Oakland. 1903.
Cope, Francis R., Jr., Dimock, Penn. 1919.
Coppee, Marie P., Ross, Marin Co. 1921.
Corwin, Helen G., 2542 Durant Ave., Berkeley. 1922.
Cox, H. E., care C. H. Reed Co., San Luis Obispo. 1916.
Cox, Richard, 3d, 1829 Arch St., Berkeley. 1919.
Cozens, Harold H., 3071 Bateman St., Berkeley. 1921.
Crane, Ada Ethel, Box 607, Westwood. 1914.
Craven, Jesse T., 5315 Roosevelt Ave., Detroit, Mich. 1909.
Crosby, Maunsell S., Grasmere Farms, Rhinebeck, N. Y. 1911.
Crum, Miss Ethel, Morada Apts., Tulare. 1920.
Culver, Geo. B., Stanford University. 1921.
Culver, Susan B., 2423 Prospect St., Berkeley. 1914.
Cummings, Byron, Univ. Ariz., Tucson, Ariz. 1916.
Cunningham, Walter, 3009 Dunham Ave., Kansas City, Mo. 1921.
Currier, Ed. S., 416 E. Chicago St., St. Johns Sta., Portland, Ore. 1904.
Dart, Mrs. Bertha L., South 6th St, Montevideo, Minn. 1922.
Davenport, Mrs. Elizabeth B., Northern Ave., Brattleboro, Vt. 1911.
Davenport, Mrs. W. S, 2730 Stuart St., Berkeley. 1922.
Davidson, Miss Pirie, S. Branch, Univ. Calif., Los Angeles. 1916.
Davies, A. E., 1327 Grove St., Berkeley. 1920.
Davis, Dr. Fred B., 401 Vernon St., Oakland. 1916.
Davis, Henry W., 10 S. Baton Rouge Ave., Atlantic City, N. J. 1922.
Davis, John M., 737 M St., Eureka. 1908.
*Dawson, W. Leon, R.D. 3, Box 83, Santa Barbara. 1906 (1915).
Dean, W. F., Three Rivers. 1901.
Deane, Ruthven, 112 W. Adams St., Chicago, Ill. 1904.
Deane, Wallace A., 1266 Columbia Road, Washington, D. C. 1919.
Deane, Walter, 29 Brewster St., Cambridge, Mass. 1907.
Dearborn, Ned, Sackett Harbor, N. Y. 1909.
Decker, F. R., Kiona, Wash. 1913.
DeGroot, Dudley S., Normal Hill Center, Los Angeles. 1916.
Dewees, Miss Elizabeth, Whitehall Rd. and Marshall St., Norristown, Pa. 1922.
Dice, Dr. Lee R., Museum of Zoology, Ann Arbor, Mich. 1914.
Dickenson, A. B., R.D. 1, Box 11B, San Gabriel. 1916.
Dickenson, Mrs. A. B., R.D. 1, Box 11B, San Gabriel. 1919.
*§Dickey, Donald R., 514 Lester Ave., Pasadena. 1910.
Dill, Dr. Robert, State Sheep Commission, Reno, Nev. 1921.
Dille, F. M., Valentine, Neb. 1903.
Dings, G. M., 2161 Ry. Exch. Bldg., St. Louis, Mo. 1920.
Disney, Dwight R., Box 278A, Rupert, Idaho. 1920.
Dixon, Joseph, Museum Vert. Zool., Berkeley. 1904.
Dodge, Laura I., 3031 Eliot St., Long Beach. 1915.
Dodge, Ralph E., R.D. 9, Box 468, Exeter. 1915.
Dodge, Mrs. Rowland B., 64 Panoramic Way, Berkeley. 1920.
Doolittle, E. A., Box 44, Painesville, Ohio. 1918.
Drachman, Myra, 3031 Eliot St., Long Beach. 1915.
Drummond, Mrs. Ella B., 2739 Bancroft Way, Berkeley. 1921.
DuBois, Alexander Dawes, 327 S. Glenwood Ave., Springfield, Ill. 1911.
Duprey, H. F., R.D. 1, Box 78B, Dixon. 1907.
Durfee, Owen, Box 125, Fall River, Mass. 1911.
Dutton, P. C., 65 High St., Stone Staffs, England. 1913.
Dwight, Dr. Jonathan, Jr., 43 W. 70th St., New York, N. Y. 1904.
Easton, Mrs. Jane F., Torrey Road, La Jolla. 1920.
Eaton, S. Harrison, Box 653, Lawrenceville, Ill. 1916.
Edson, J. M., Marietta Road, Bellingham, Wash. 1911.
Edwards, H. Arden, R.D. 1, Box 284, Los Angeles. 1913.
*Eggleston, Prof. Julius W., Cuttingsville, Rutland Co., Vt. 1913 (1919).
Elmore, Louis A., 486 Boulevard, Ashland, Ore. 1920.
*Emerson, W. Otto, Palm Cottage, Hayward. 1920 (1921).
Enochs, Rex P., 715 S. Hope St., Los Angeles. 1921.
Esterly, Dr. C. O., Occidental College, Los Angeles. 1908.
Evans, Ella A., Exeter. 1922.
Evans, Frank C., Crawfordsville, Ind. 1918.
Evans, J. Harold, R.D. 4, Box 500, Santa Rosa. 1917.
Evans, Wm. V., Livingston, Mont. 1920.

Everhart, Mrs. L. U., Thermal. 1922.
Evermann, Dr. Barton W., Cal. Acad. Sciences, San Francisco. 1911.
Falger, Annie M. (Mrs. Wm.), Modesto. 1917.
Farber, William P., 2605 Etna St., Berkeley. 1921.
Fargo, Mrs. Minerva J., 1632 N. Kingsley Drive, Los Angeles. 1914.
Farnsworth, Dean, 1009 Manning St., Winfield, Kan. 1921.
Felger, A. H., North Side High School, Denver, Colo. 1920.
Felton, Mrs. C. N., 216 Pine St., San Francisco. 1916.
*Ferguson, Mrs. Aurelia B., 999 Gramercy Drive, Los Angeles. 1922.
Ferguson, Mrs. Mary Van E., 5 Panoramic Way, Berkeley. 1915.
Field, Clyde, 1859 Julian Ave., San Diego. 1919.
Field, Geo. R., Requa, Del Norte Co. 1921.
Finley, Wm. L., Jennings Lodge, Ore. 1900.
Fish, Mrs. Frances Webster, 6215 Chabot Road, Oakland. 1917.
Fisher, Dr. A. K., Biol. Survey, Washington, D. C. 1904.
Fisher, Miss Elizabeth W., 2222 Spruce St., Philadelphia, Pa. 1910.
Fisher, Prof. Walter K., Stanford Marine Laboratory, Pacific Grove. 1900.
Fitzpatrick, T. J., Bethany, Neb. 1913.
Fleming, J. H., 267 Rusholme Road, Toronto, Ont., Canada. 1910.
Fletcher, Lyle R., 353 N. Archer St., Norton, Kas. 1920.
Flinn, Catherine Mills, 1799 University Ave., Berkeley. 1920.
Flynn, Helen, 1546 Shattuck Ave., Berkeley. 1920.
Forbush, E. H., State House, Boston, Mass. 1916.
Forrest, Earle R., 205 N. Main St., Washington, Pa. 1910.
Fortiner, John C., Box 496, Brawley. 1910.
Fowler, Frederick H., 221 Kingsley Ave., Palo Alto. 1901.
Frank, Arthur, W. Wash. Exp. Sta., Puyallup, Wash. 1920.
Frazer, J. Thomas, Jr., 432 W. Hawthorne St., Eureka. 1920.
Frederick, Mrs. Adeline, 1636 Woolsey Ave., Berkeley. 1922.
Freeman, John G., Box 1238, Brawley. 1922.
French, Mrs. A. J., Carlton, Ore. 1921.
French, James G., The Menagerie, 3628 Saanich Road, Victoria, B. C., Canada. 1918.
Frye, Prof. T. C., Univ. Wash., Seattle, Wash. 1919.
Fuertes, Louis A., 201 Wyckoff Ave., Ithaca, N. Y. 1904.
Gabrielson, Ira N., 515 P. O. Bldg., Portland, Ore. 1919.
Gallup, Frederick Norman, Escondido. 1921.
Gamble, Hamilton, 476 8th Ave., San Francisco. 1922.
Ganier, Albert F., 2507 Ashwood Ave., Nashville, Tenn. 1921.
Gartrell, Geo. N., Summerland, B. C., Canada. 1917.
Gault, Benj. T., 564 N. Main St., Glen Ellyn, DuPage Co., Ill. 1905.
Gay, Harold S., 200 S. Wilson Ave., Alhambra. 1901.
Geiselhart, Miss Josephine, Concord. 1920.
Germain, Miss Claire, Balboa. 1915.
Giannini, Chas. A., Poland, N. Y. 1919.
Gifford, Dr. Harold, 420 S. 36th St., Omaha, Neb. 1916.
Gignoux, Claude, 73 Tunnel Road, Berkeley. 1919.
Gilchrist, Francis G., 240 Webster St., San Francisco. 1920.
Giles, Roscoe I., 82 Newton St., Marlborough, Mass. 1917.
Gilman, M. French, Banning. 1901.
Girvin, F. H., Brawley Hardware Co., Brawley. 1919.
Goelitz, Herman, 944 Alameda Drive, Portland, Ore. 1920.
*Goelitz, Walter A., 170 Nunda Blvd., Rochester, N. Y. 1915 (1920).
Goethe, C. M., Capital Natl. Bank Bldg., Sacramento. 1915.
Goldman, E. A., Biol. Survey, Washington, D. C. 1901.
Goldman, Luther J., Biol. Survey, Boise, Idaho. 1902.
Goodcell, Mrs. Marion L., 864 D St., San Bernardino. 1914.
Gormley, A. L., Box 80, Arnprior, Ont., Canada. 1918.
Grant, U. S., 4th, 749 S. Gramercy Pl., Los Angeles. 1909.
Green, Thos. L., 7076 Franklin Ave., Hollywood. 1921.
Grey, Henry, R.D. 2, Box 154A, San Diego. 1901.
Griffee, Bill, R.D. 3, Box 68, Corvallis, Ore. 1919.
Grinnell, Geo. Bird, 238 E. 15th St., New York, N. Y. 1914.
*Grinnell, Hilda Wood (Mrs. Joseph), 2811 College Ave., Berkeley. 1912 (1921).
*Grinnell, Dr. Joseph, Museum Vert. Zool., Berkeley. 1894 (1919).
Grinnell, Willard Fordyce, 2811 College Ave., Berkeley. 1921.
Guion, Geo. Seth, Napoleonville, La. 1911.

Gunn, Miss Amy E., 1342 Filbert St., San Francisco. 1914.
Gunthorp, Horace, Univ. Wash., Seattle, Wash. 1920.
Guthrie, Miss Esther, 2201 H St., Sacramento. 1918.
Hadeler, E. W., Painesville, Ohio. 1918.
Hall, Mrs. Carlotta C., 1615 La Loma Ave., Berkeley. 1915.
Hall, Mrs. C. H., 512 W. 30th St., Los Angeles. 1921.
Halladay, Daniel S., R.D. 3, Box 201, Anaheim. 1910.
Hallinen, J. E., Cooperton, Kiowa Co., Okla. 1921.
Hanaford, A. W., R.D. 9, Box 1210, Los Angeles. 1917.
Hands, Frank H., Dos Cabezos, Ariz. 1920.
Hanford, Forrest, 3825 Division St., Oakland. 1912.
Hann, H. H., Parkdale, Ore. 1909.
Hanna, Dr. G. Dallas, Cal. Acad. Sciences, San Francisco. 1921.
*Hanna, W. C., 1000 Pennsylvania Ave., Colton. 1902 (1921).
Harlow, Richard C., 369 Foster Ave., State College, Penn. 1919.
Harmon, Mrs. Frances M., 2115 Estrella Ave., Los Angeles. 1912.
Harper, Francis, Cornell Univ., Ithaca, N. Y. 1920.
*Harris, Harry, 18 W. 52d St., Kansas City, Mo. 1914 (1919).
Harrison, H. M., 319 Penn St., Camden, N. J. 1920.
Hart, Cecil, R.D. 6, Box 432, Los Angeles. 1920.
Hartman, Paul J., 1118½ Maple Ave., Los Angeles. 1917.
Hathaway, H. S., Box 1466, Providence, R. I. 1912.
Havemeyer, Henry O., 129 Front St., New York, N. Y. 1917.
Hayes, Mrs. F. M., Box 591, Davis. 1919.
Haynes, Mrs. A. H., 1734 University Ave., St. Paul, Minn. 1921.
Head, Miss Anna, 2809 Forest Ave., Berkeley. 1912.
Heath, Prof. Harold, 1147 Ramona St., Palo Alto. 1919.
Hedges, Chas. F., Box 24, Miles City, Mont. 1919.
Hegner, Carl D., 810 Avoca St., Los Angeles. 1914.
Heineman, Oluf J., 1664 Grove St., San Francisco. 1908.
Heller, Edmund, Field Museum Nat. Hist., Chicago, Ill. 1894.
Helme, Arthur H., Miller Place, Suffolk Co., N. Y. 1911.
Henderson, Dr. H. C., Casitas Road, Carpinteria. 1919.
Henderson, Junius, 627 Pine St., Boulder, Colo. 1909.
Henderson, Walter C., Biol. Survey, Washington, D. C. 1918.
Hendren, Miss Elizabeth, Occidental. 1920.
Henshaw, Judge F. W., 762 Mills Bldg., San Francisco. 1915.
*Hersey, F. Seymour, 6 Maple Ave., Taunton, Mass. 1915 (1920).
Hersey, L. J., Wray, Colo. 1909.
Hill, James H., Box 485, New London, Conn. 1919.
Hill, Willard, Star Route, Wasco, Kern Co. 1918.
Hilton, Dr. W. A., Claremont. 1921.
Hoffman, Louis E., Box Cor. Benner and Shults St., Los Angeles. 1920.
Hoffmann, Ralph, Carpinteria. 1920.
Hohfeld, Mrs. Edward, 754 3d Ave., San Francisco. 1920.
*Holland, Harold M., Box 515, Galesburg, Ill. 1901 (1920).
Holleman, Ridley, 205 Duffield St., San Antonio, Texas. 1917.
Hollister, N., Nat. Zool. Park, Washington, D. C. 1920.
Holman, F. C., 866 Post St., San Francisco. 1914.
*Hoover, Theodore J., 450 Melville Ave., Palo Alto. 1898 (1916).
Hornung, Dr. John, 5219 Wilton Place, Los Angeles. 1920.
Horsfall, R. Bruce, 324½ S. Broadway, Portland, Ore. 1914.
Horsfall, Mrs. R. Bruce, Reed College Library, Portland, Ore. 1916.
Houghton, John D., care Dr. J. W. Flinn, Prescott, Ariz. 1922.
Howard, O. W., Box 484, Los Angeles. 1895.
*§Howell, A. B., 770 S. Pasadena Ave., Pasadena. 1908 (1915).
Howell, Arthur H., 2919 S. Dakota Ave., Washington, D. C. 1916.
Howell, B. F., Jr., 52 Patton Ave., Princeton, N. J. 1909.
Howes, Paul G., 46 Auldwood Road, Stamford, Conn. 1910.
Huber, Wharton, 225 St. Marks Square, Philadelphia, Pa. 1915.
Huddleston, Mrs. Alice M., R.D. 1, Box 539, San Gabriel. 1921.
Hudson, L. W. 2524 Belmont Ave., Fresno. 1917.
*Huey, Laurence, 2875 Clay Ave., San Diego. 1909 (1921).
Hunt, C. J., 5847 W. Superior St., Chicago, Ill. 1919.

Hunt, Richard, Museum Vert. Zool., Berkeley. 1918.
Hunter, J. S., Box 482, San Mateo. 1903.
Hurley, John B., 225 East E St., Yakima, Wash. 1921.
Husher, Mrs. Gertrude H., 821 S. Hope St., Los Angeles. 1913.
Hyde, Mrs. Chas. Gilman, 2579 Buena Vista Way, Berkeley. 1921.
Hyde, Mrs. Silkman E., Regena, Idaho. 1922.
Illingsworth, J. F., Univ. Hawaii, Honolulu, T. H. 1896.
Illo, Howard C., 11th and Main Sts., Los Angeles. 1920.
Ingersoll, Albert M., 908 F St., San Diego. 1895.
Jackson, Hartley H. T., Biol. Survey, Washington, D. C. 1921.
Jackson, Ralph W., R.D. 1, Cambridge, Md. 1917.
Jacobs, J. Warren, 404 S. Washington St., Waynesburg, Pa. 1909.
Jacobsen, W. C., 2319 M St., Sacramento. 1916.
Jay, Antonin, 1622 Pennsylvania Ave., Los Angeles. 1901.
Jenkins, Ida G., 30 Dearborn St., Roxbury, Mass. 1914.
Jenney, Chas. F., 100 Gordon Ave., Hyde Park, Mass. 1917.
Jesurun, Dr. Mortimer, 802 American Ave., Long Beach. 1916.
Jewett, Stanley G., 582 Bidwell Ave., Portland, Ore. 1909.
Job, Herbert K., 601 Washington Ave., West Haven, Conn. 1915.
Johnson, A. C., Whittier Nat. Bank, Whittier. 1919.
Johnson, Miss Clare E., Room 151, City Hall, San Francisco. 1921.
Johnson, Frank Edgar, 16 Amackassin Terrace, Yonkers, N. Y. 1911.
Johnson, H. H., Pittsfield, Me. 1920.
Johnson, Dr. Myrtle E., National City. 1908.
Johnston, Ivan Murray, W. 8th St., Upland. 1920.
Johnstone, W. B., Edgewood, B. C., Canada. 1918.
Jonas, Coloman, 1023 Broadway, Denver, Colo. 1910.
Jonas, John, 215 W. Park St., Livingston, Mont. 1921.
Jones, Dr. Lombard Carter, Falmouth, Mass. 1918.
Jones, Dr. Lynds, Museum Oberlin Coll., Oberlin, Ohio. 1911.
Jordan, A. H. B., Everett, Wash. 1911.
Jordan, Dr. David Starr, Stanford University. 1902.
Joy, Emmet, San Andreas. 1920.
Judson, W. B., 826 Washington Bldg., Los Angeles. 1901.
Kaeding, Geo. L., 104 N. Columbus Ave., Glendale. 1903.
Kell, Delacourt, Claremont. 1921.
Keeler, Leonarde, 155 El Camino Real, Berkeley. 1922.
Kelley, Mrs. Harriet P., 2505 Logan St., Selma. 1917.
Kellogg, Miss Louise, Box 248, Suisun. 1911.
Kellogg, Miss Mildred, 2232 Piedmont Ave., Berkeley. 1921.
Kellogg, Ralph T., Silver City, N. M. 1916.
Kellogg, Prof. Vernon L., Stanford University. 1901.
Kelly, Junea W. (Mrs. G. E.), 1311 Grand St., Alameda. 1918.
*Kennard, Frederick H., Dudley Road, Newton Centre, Mass. 1911 (1916).
Kennedy, Clarence H., Zool. Dept., Ohio State Univ., Columbus, Ohio. 1912.
Kennedy, Miss Eveline, 5330 Pasadena Ave., Los Angeles. 1921.
Keyes, Prof. Chas. R., Mt. Vernon, Iowa. 1900.
Kibbe, A. S., 1534 Grove St., Berkeley. 1917.
Kibbe, Bessie W. (Mrs. A. S.), 1534 Grove St., Berkeley. 1917.
Kimball, H. H., Seal Beach. 1909.
King, Albert H., 3612 N. Griffin Ave., Los Angeles. 1920.
King, Benjamin H., 1215 Lakeshore Drive, Coeur d'Alene, Idaho. 1921.
Kirn, Albert J., R.D. 4, Solomon, Kas. 1918.
Kitchin, E. A., 4014 N. 35th St., Tacoma, Wash. 1917.
Kitt, W. Stanley, 129 S. 5th Ave., Tucson, Ariz. 1921.
Kittredge, Joseph, Jr., U. S. Forest Service, Washington, D. C. 1915.
Kloss, Philip, 24 Greenbank Ave., Piedmont. 1922.
Kluegel, Mrs. Edward A., Carmel. 1916.
Knickerbocker, Chas. K., 445 N. Sacramento Ave., Carpenter Sta., Chicago, Ill. 1905.
Knowlton, Dr. F. H., U. S. Nat. Museum, Washington, D. C. 1910.
Kofoid, Prof. C. A., Zool. Dept., Univ. Calif., Berkeley. 1909.
Kohler, Louis S., R.D. 2, Paterson, N. J. 1909.
Krehbiel, Leonard, Box 743, Upland. 1919.
Kretzman, Prof. P. E., 3705 Texas Ave., St. Louis, Mo. 1914.
Kuser, John Dryden, Bernardsville, N. J. 1912.
Kuykendall, W. A., Eugene, Ore. 1916.

Labarthe, Jules, 2727 Russell St., Berkeley. 1914.
La Jeunesse, H. V., 2517 Webb St., Alameda. 1916.
Laloge, Emily Dolores, 2253 Encinal Ave., Alameda. 1922.
Lamb, Chester C., 549 W. 43d Place, Los Angeles. 1899.
Lancashire, Sarah H. (Mrs. J. Henry), Graftonwood, Manchester, Mass. 1911.
Lander, Bessie M., R.D. 1, Box 106, Strathmore. 1920.
Lane, Geo. W., Morgan Hill. 1914.
Langevin, Elmer, 325 S. Broadway, Crookston, Minn. 1922.
Lano, Albert, 220 E. Lafayette Ave., Fayetteville, Ark. 1920.
Lastreto, C. B., 260 California St., San Francisco. 1913.
Laubenfels, Max Walker de, 620 19th St., Huntington Beach. 1921.
*§Law, J. Eugene, Altadena. 1900 (1915).
*§Law, Laura Beatty (Mrs. J. E.), Altadena. 1915 (1919).
Lawrence, Mabel M., 1750½ W. 24th St., Los Angeles. 1921.
Layne, J. Gregg, 737 S. Spring St., Los Angeles. 1912.
Leach, Frank A., 217 Hillside Ave., Piedmont. 1917.
Lee, Mrs. Melicent H., El Cajon. 1920.
Lee, Ren M., 231 N. C St., Tulare. 1922.
Leggett, Dr. R. M., 2140 9th Ave., San Francisco. 1918.
Lelande, H. J., 337 Copp Bldg., Los Angeles. 1897.
Leopold, Aldo, 135 S. 14th St., Albuquerque, N. M. 1916.
Leopold, Nathan F., Jr., 4754 Greenwood Ave., Chicago, Ill. 1920.
Libby, Miss Gretchen L., 310 2d Ave., Santa Barbara. 1911.
Lien, Carl, Clallam Bay, Wash. 1917.
Ligon, J. Stokley, Box 131, Albuquerque, N. M. 1914.
Liliencrantz, H. T., Rancho Las Cimas, Hollister. 1916.
Limbert, R. W., Box 1284, Boise, Idaho. 1921.
Lindemann, Miss W. C., 1435 8th St., Alameda. 1922.
Lindsay, Dr. D. Moore, 808 Boston Bldg., Salt Lake City, Utah. 1915.
§Little, Luther, 1403 Garfield Ave., S. Pasadena. 1914.
Littlejohn, Chase, 1226 Warren St., Redwood City. 1901.
Livesey, Alice Rose, 373 W. California St., Glendale. 1921.
Loftfield, Gorm, Carnegie Institution, Tucson, Ariz. 1918.
Lombardi, Mrs. M. E., 2249 Piedmont Ave., Berkeley. 1916.
Loring, J. Alden, Owego, Tioga Co., N. Y. 1914.
§Love, Guy, R.D. 1, El Cajon. 1913.
Lunt, James C., 109 Liberty St., San Francisco. 1922.
Lusk, Richard D., Winkleman, Ariz. 1915.
Luther, Clarence H., 8 McIlroy Bldg., Fayetteville, Ark. 1909.
Lyon, Ray B., Box 186, Paso Robles. 1920.
MacKaye, David L., Tulare. 1922.
McAtee, W. L., Biol. Survey, Washington, D. C. 1907.
McDuff, Esther, 555 Union Ave., San Bernardino. 1919.
McGettigan, Carroll, 2644 Filbert St., San Francisco. 1921.
*McGregor, R. C., Bureau of Science, Manila, P. I. 1893 (1916).
McGrew, Albert D., 5611 Stanton Ave., Pittsburg, Pa. 1920.
McKeough, Dr. Geo. T., Erie Manor, R.D. 1, Blenkerin, Ontario, Canada. 1922.
McKibben, J. W., 2522 Piedmont Ave., Berkeley. 1921.
McKinnon, Ross, Blue Rapids, Kas. 1921.
McLain, R. B., Box 132, Hollywood. 1897.
McLean, Donald D., 2826 Derby St., Berkeley. 1916.
McLean, Robert R., 2904 Granada St., San Diego. 1922.
McLellan, Antonio, 309 San Francisco St., El Paso, Tex. 1920.
McLellan, Miss Mary E., 2935 Pine St., Berkeley. 1919.
McMullen, Turner E., 551 Bailey St., Camden, N. J. 1920.
Magee, William A., Jr., R.D. Fruitvale, Box 433, Oakland. 1912.
Mailliard, Ernest C., Federal Reserve Bank, San Francisco. 1909.
Mailliard, John W., 230 California St., San Francisco. 1894.
*Mailliard, Joseph, 1815 Vallejo St., San Francisco. 1895 (1920).
Marshall, Dr. Benj. M., 2036 D St., Eureka. 1913.
Marshall, Perry R. F., 7213 Sunset Blvd., Los Angeles. 1920.
Martin, Mrs. Bertha Davis, 1644 Maltman Ave., Los Angeles. 1920.
Martin, De Loach, 1223 S. Washington Ave., Marshall, Texas. 1916.
Massey, Herbert, Ivy Lea, Burnage, Didsbury, Manchester, England. 1909.
Maxson, Asa C., Longmont, Colo. 1920.
Mead, Mrs. Edwin B., 2618 Etna St., Berkeley. 1920.

Meade, Mrs. Calvert, Box 161, Carmel. 1916.
Meadows, Donald C., 231 N. Grand St., Orange. 1919.
Meeker, Jesse C. A., Box 161, Danbury, Conn. 1907.
Meister, H. D., Wauseon, Ohio. 1909.
*§Mershon, W. B., Saginaw, Mich. 1911 (1919).
Meyers, Harold E., Medina, N. Y. 1920.
Michael, Chas. W., Yosemite. 1916.
Middleton, R. J., Jeffersonville, Pa. 1918.
Millard, F. C., 1424 W. Pine St., Alhambra. 1922.
Miller, Mrs. Delphia S., 1523 Tonawanda Ave., Los Angeles. 1921.
Miller, Frederic W., 935 S. Gaylord St., Denver, Colo. 1922.
Miller, Dr. Loye Holmes, S. Branch, Univ. Calif., Los Angeles. 1905.
Miller, Mary Mann, 5928 Hayes Ave., Los Angeles. 1920.
Miller, R. C., 2406 Fulton St., Berkeley. 1921.
Miller, W. De Witt, Amer. Museum Nat. Hist., New York, N. Y. 1909.
§Mills, Enos A., Longs Peak, Estes Park, Colo. 1914.
Miner, Dr. H. N., Penryn. 1903.
§Mitchell, H. H., Prov. Museum, Normal School, Regina, Sask., Canada. 1915.
Mitchell, Dr. Walton I., Paonia, Delta Co., Colo. 1909.
Mix, Mrs. Arthur J., 1915 W. 8th St., Los Angeles. 1922.
Moffitt, James, 1818 Broadway, San Francisco. 1917.
Moore, Miss Nellie, 122 Falcon Ave., Long Beach. 1915.
Moore, Raymond W., 755 Emory St., San Jose. 1919.
Moore, Robert T., 46 Mansion Ave., Haddonfield, N. J. 1911.
Moore, Wm. Warren, 1431 9th St., Eureka. 1921.
Moran, R. B., 1318 S. Gramercy Place, Los Angeles. 1897.
*§Morcom, G. Frean, 243 N. Coronado St., Los Angeles. 1904 (1915).
More, R. L., Vernon, Texas. 1911.
Morley, S. Griswold, 2535 Etna St., Berkeley. 1916.
Mullen, James L., 1264 Logan Ave., Salt Lake City, Utah. 1915.
Munro, J. A., Okanagan Landing, B. C., Canada. 1914.
Murie, Olaus J., 219 7th Ave. S., Moorehead, Minn. 1913.
Musgrave, Ethel Weatherford (Mrs. M. F.), Box 765, Phoenix, Ariz. 1921.
Myers, Mrs. H. W., 311 N. Ave. 66, Los Angeles. 1912.
*Nace, C. A., 171 W. Santa Clara St., San Jose. 1920 (1920).
Nash, Herman W., Box 264, Pueblo, Colo. 1922.
Neff, Johnson A., Marionville, Mo. 1920.
Neilson, Mrs. Katherine, 1419 Versailles St., Alameda. 1920.
Newhall, Mrs. Chas. S., 2629 Piedmont Ave., Berkeley. 1916.
Nice, Mrs. Margaret Morse, Norman, Okla. 1921.
Nichols, J. T., Amer. Museum Nat. Hist., New York, N. Y. 1909.
Nicholson, Donald J., Orlando, Fla. 1911.
Nicholson, Gordon, W. 7th St., Ontario. 1919.
Nicholson, Helen S., 1420 Grant St., Berkeley. 1921.
Niedrach, Robert J., 30 Pennsylvania St., Denver, Colo. 1922.
Nienburg, Miss Matilda V., 2031 Alameda Ave., Alameda. 1922.
Noack, H. R., 309 Perry St., Oakland. 1901.
Nokes, Dr. I. D., 1120 Marsh-Strong Bldg., Los Angeles. 1914.
Norris, Joseph Parker, Jr., 2122 Pine St., Philadelphia, Pa. 1911.
Norris, Roy, 725 N. 10th St., Richmond, Ind. 1911.
Norton, Arthur H., 22 Elm St., Portland, Me. 1918.
Oberholser, Dr. Harry C., 2805 18th St., N. W., Washington, D. C. 1904.
O'Farrell, Mrs. Mabel E., 2403 F St., San Diego. 1917.
Ohl, H. C., McKittrick. 1913.
Ohlendorf, W. C., 320 E. Stewart Ave., Park Ridge, Ill. 1910.
Osgood, Dr. Wilfred H., Field Museum Nat. Hist., Chicago, Ill. 1893.
Osincup, Clayton A., 30 W. Montana St., Pasadena. 1922.
Osterhout, Geo. E., Windsor, Colo. 1915.
Overholtzer, John E., 6 W. Main St., Morristown, Pa. 1920.
Overington, R. Bruce, 220 Golden Gate, San Francisco. 1920.
Owen, Virgil W., 832 Beacon St., Los Angeles. 1896.
Palmer, Miss Elizabeth Day, 1741 Harvard Blvd., Los Angeles. 1909.
Palmer, R. H., Instituto Geologico, Mexico City, Mex. 1915.
*Palmer, Dr. T. S., 1939 Biltmore St., N. W., Washington, D. C. 1903 (1920).
Pangburn, Clifford H., 299 Madison Ave., New York City, N. Y. 1920.
Parcell, Miss Zulema L., 1500 W. 9th St., Los Angeles. 1919.

Parker, Herbert, South Lancaster, Mass. 1911.
Parmenter, Henry E., 526 E. Valerio St., Santa Barbara. 1916.
Paroni, Clelia A., 2430 Bancroft Way, Berkeley. 1920.
Patterson, J. E., Box 478, Ashland, Ore. 1922.
Paul, J. H., 1320 E. 2d St. S., Salt Lake City, Utah. 1915.
Paul, Lucius H., 436 Carter St., Rochester, N. Y. 1911.
Paulson, Martin C., R.D. 5, Nevada, Ia. 1922.
Peabody, Rev. P. B., Blue Rapids, Kan. 1904.
Pearson, T. Gilbert, 1974 Broadway, New York, N. Y. 1910.
Peck, Morton E., 244 N. 12th St., Salem, Ore. 1909.
Pemberton, J. R., Box 1112, Tulsa, Okla. 1900.
Pennock, Chas. J., Kennett Square, Philadelphia, Pa. 1909.
Peyton, Lawrence, R.D. 2, Fillmore. 1909.
Peyton, Sidney B., Sespe. 1913.
Phelps, Frank M., 212 E. 4th St., Elyria, Ohio. 1912.
*§Philipp, Philip Bernard, 220 Broadway, New York, N. Y. 1911 (1920).
Phillips, C. L., 5 W. Weir St., Taunton, Mass. 1915.
§Phillips, John C., Knobfields, Wenham, Mass. 1911.
*Pierce, Wright M., Box 116, Claremont. 1902 (1919).
Pierpont, Philip, Nordhoff. 1913.
Pilsbury, Frank O., 1088 Main St., Walpole, Mass. 1911.
Pitcher, Mrs. E. C., R.D. I, Box 273, Hayward. 1920.
Pope, E. F., Box 113, El Reno, Okla. 1913.
Potter, Miss Carolyn B., 1314 Alice St., Oakland. 1920.
Potter, Miss Jessica A., 1118 Santee St., Los Angeles. 1922.
Powell, Miss Helen, 2703 Dwight Way, Berkeley. 1914.
Pratt, Helen S., 245 W. Ridgway, Eagle Rock. 1920.
Price, A. E., Grant Park, Ill. 1905.
Prill, Dr. A. G., Scio, Ore. 1921.
*Pringle, Miss Cornelia Covington, 1705 Gough St., San Francisco. 1915.
Procter, James Norris, Box 188, Santa Paula. 1922.
Purdy, William B., Milford, Mich. 1921.
Quillin, Roy W., 1025 Summit Ave., San Antonio, Texas. 1921.
Racey, Kenneth, 3262 1st Ave. W., Vancouver, B. C. 1921.
Raker, Mary E., 1484 E. Sherman St., Portland, Ore. 1919.
Rand, F. L., 1108 Arcade Bldg., St. Louis, Mo. 1921.
Randolph, Miss Flora A., 2962 Derby St., Berkeley. 1907.
Rankin, Edward P., 2410B Bancroft Way, Berkeley. 1913.
Ransom, Webster H., 708 W. 20th Ave., Spokane, Wash. 1921.
Rathbun, S. F., 217 14th Ave. N., Seattle, Wash. 1904.
Rawson, Charles I., Oxford, Mass. 1918.
Ray, Milton S., 29 Spear St., San Francisco. 1899.
Raymond, Mrs. C. E., 21 3d St., Hinsdale, Ill. 1921.
Reichenberger, Mrs. E. M. B., Amer. Museum Nat Hist., New York City, N. Y. 1922.
Reid, Russell, 208 3d St., Bismark, N. Dak. 1921.
Reis, C. O., 116 Diamond St., Redondo Beach. 1917.
Rett, Egmont J., 3060 Larimer St., Denver, Colo. 1922.
Reygadas, Ynez Mexia de, 401 Medical Bldg., San Francisco. 1921.
Reynolds, L. R., 124 Park St., Brockton, Mass. 1913.
Rich, Dr. Guy C., 1820 El Cerrito Place, Hollywood. 1911.
Rich, Selwyn, Box 55, Claremont. 1919.
Rich, Waldo L., Saratoga Springs, N. Y. 1919.
Richards, E. B., 128 Chester St., Grass Valley. 1909.
Richards, Dr. T. W., Naval Hospital, Annapolis, Md. 1908.
Richards, W. W., 1512 Broadway, Oakland. 1915.
Richardson, W. D., 4215 Prairie Ave., Chicago, Ill. 1918.
Richey, J. Howard, 261 W. Dakota St., Pasadena. 1914.
Richmond, Dr. Chas. W., U. S. Nat. Museum, Washington, D. C. 1904.
Richmond, Frank, care Richmond Bros., El Centro. 1920.
Rigdon, Dr. R. L., 1617 Broderick St., San Francisco. 1921.
Riley, J. H., U. S. Nat. Museum, Washington, D. C. 1909.
Rittenhouse, Prof. Samuel, Univ. S. Cal., Los Angeles. 1916.
Ritter, Prof. W. E., LaJolla. 1901.
Robbins, Reginald C., North-east Harbor, Maine. 1921.
Roberts, Dr. T. S., Zoological Museum, Univ. Minn., Minneapolis, Minn. 1909.

Robertson, Howard, 157 Wilton Drive, Los Angeles. 1896.
§Robertson, John McB., R.D. 1, Box 13, Buena Park, Orange Co. 1913.
Robertson, Mrs. John McB., Buena Park. 1920.
Roe, Mrs. E. D., 225 Cumberland St., San Francisco. 1919.
Ross, Ronald C., 388 Dearborn St., Pasadena. 1920.
Rowan, Wm., Dept. Zool., Univ. Alberta, Edmonton, Alta., Canada. 1921.
Rowley, J., 403 S. 1st St., Alhambra. 1909.
Rush, Lora Gertrude, 1607 Walnut St., Berkeley. 1920.
Rust, Henry J., Box 683, Coeur d'Alene, Idaho. 1911.
Sage, Jno. H., Portland, Conn. 1910.
Sampson, W. B., 1005 N. San Joaquin St., Stockton. 1894.
Sanderson, Miss Dorothy, 1217 McCadden Pl., Los Angeles. 1922.
Sanford, Dr. Leonard C., 347 Temple St., New Haven, Conn. 1915.
Sanford, W. H., 919 W. Acacia St., Stockton. 1915.
Sapp, Charles, 544 Markwell Bldg., Long Beach. 1922.
Saunders, Aretas A., 48 Longview Ave., Fairfield, Conn. 1909.
Saunders, Mrs. Kenneth, Creston Road, High Acres. 1920.
Saunders, W. E., London, Ont., Canada. 1910.
Saville, Miss Elsie M., 403 E. 8th St., Topeka, Kan. 1920.
Schaefer, Oscar F., 669 Genesee St., Rochester, N. Y. 1917.
Schleichert, Ernest K., Mathias Point, Va. 1919.
Schlesinger, Mrs. Jane L., 1417 Filbert St., Oakland. 1915.
Schneider, Fred A., care Warren Dried Fruit Co., San Jose. 1901.
Schneider, Mrs. G. H., 4618 Kingswell Ave., Los Angeles. 1921.
§Schneider, J. J., Box 363, Anaheim. 1899.
Schussler, Geo. W., 1345 Oak St., San Francisco. 1911.
Sclater, William Lutley, 10 Sloane Court, London, S. W., England. 1909.
Scott, Carroll DeWilton, 1620 7th St., San Diego. 1915.
Sharp, Clarence S., Escondido. 1902.
Sharples, Robert P., West Chester, Pa. 1911.
Shaw, Prof. W. T., 1000 Thatuna St., Pullman, Wash. 1911.
Sheldon, Harry H., care Commercial Tr. & Svgs. Bank, Santa Barbara. 1922.
Shelton, Alfred C., Johnston-Shelton Co., Dayton, Ohio. 1909.
Shepard, John Alden, Route A, Morgan Hill. 1919.
Shepherd, A. R., 457 W. Burchett St., Glendale. 1920.
Shepherd, Hattie E., R.D. 1, Box 73, Redlands. 1920.
*Sherman, Althea R., National, via McGregor, Iowa. 1911 (1916).
Shinn, Mrs. Dora H., 433 Griffith Ave., San Mateo. 1921.
Shiras, George, 3d, Stoneleigh Court, Washington, D. C. 1914.
Shupee, George C., Box 964, San Antonio, Texas. 1920.
Silliman, Edmund, Alisal and Ryker Sts., Salinas. 1918.
Silliman, O. P., 220 Salinas St., Salinas. 1913.
Simmons, George F., 701 Holman Ave., Houston, Texas. 1913.
Simonds, Dr. Paul E., 304 Loring Bldg., Riverside. 1922.
Sismey, E. D., Box 222, Penticton, B. C., Canada. 1919.
*Skinner, M. P., Yellowstone Park, Wyo. 1915 (1920).
Sloanaker, Jos. L., 907 W. Mansfield Ave., Spokane, Wash. 1910.
Smith, Allyn G., 1721 Madera St., Berkeley. 1909.
Smith, Austin Paul, Apartado 412, San Jose, Costa Rica. 1907.
Smith, A. Russell, Mt. Carmel Ave., North Glenside, Penn. 1919.
Smith, C. R., 563 42d Ave., San Francisco. 1917.
Smith, Prof. Frank, 1005 W. California Ave., Urbana, Ill. 1911.
Smith, Franklin J., Box 98, Eureka. 1913.
Smith, Horace G., 2918 Lafayette St., Denver, Colo. 1914.
Smith, Napier, care Bank of Montreal, Magog, Quebec. 1919.
Smyth, Mrs. W. H., Fernwald, head of Dwight Way, Berkeley. 1918.
Snyder, Prof. J. O., Box 775, Stanford University. 1900.
Spaulding, M. Herrick, Agr. Coll., Bozeman, Mont. 1918.
Springer, Charles, Cimarron, N. Mex. 1920.
Stacey, John William, 634 Powell St., San Francisco. 1920.
Stafford, Walter A., 31 Park Way, Piedmont. 1917.
Stanford, Miss Mabel A., Box 124, Claremont. 1921.
Steilberg, Mrs. E. Van E., 1 Panoramic Way, Berkeley. 1918.

Steinbeck, William, 1029 N. Hunter St., Stockton. 1897.
Stephens, T. C., Morningside College, Sioux City, Iowa. 1914.
Stephenson, Miss Omie, Monte Vista, Colo. 1922.
Still, Donald, 63371 Tyndall Ave., Tucson, Ariz. 1918.
Stivers, Dr. C. G., 406 Auditorium Bldg., Los Angeles. 1914.
Stoddard, H. L., Public Museum, Milwaukee, Wis. 1914.
Stone, D. D., R.D. 3, Oswego, N. Y. 1909.
Stone, Geo. E., 1725 Le Roy Ave., Berkeley. 1912.
Stoner, Emerson A., Box 444, Benicia. 1918.
Storer, Miss Mary S., 467 San Pablo Ave., Fresno. 1914.
Storer, Tracy I., Museum Vert. Zool., Berkeley. 1910.
Stormont, W. P., 219 W. Ave. 51, Los Angeles. 1917.
Stow, Harry P., 1617 Central Ave., Alameda. 1921.
Strauss, Alex., Banning. 1922.
Streator, Clark P., 16 Mason St., Santa Cruz. 1919.
*§Strong, W. A., 41 Grand Ave., San Jose. 1912 (1920).
Strong, Wm. Duncan, 2522 Ridge Road, Berkeley. 1921.
Stuart, Geo. H., 3d, 923 Clinton St., Philadelphia, Pa. 1913.
Sugden, J. W., 47 S. 8th W. St., Salt Lake City, Utah. 1915.
Suits, Clarence L., 149 Fairmont Ave., Eagle Rock. 1920.
Swales, B. H., U. S. Nat. Museum, Washington, D. C. 1906.
Swarth, Harry S., Museum Vert. Zool., Berkeley. 1897.
Sweeney, Joseph A., U. S. Forest Service, Nenzel, Neb. 1912.
Swenk, Prof. Myron Harmon, 1410 N. 37th St., Lincoln, Neb. 1916.
Swezy, Dr. Olive, Zool. Dept., Univ. Cal., Berkeley. 1914.
Tanner, V. M., Dixie Normal Coll., St. George, Utah. 1919.
Taverner, P. A., Zool. Div., Geol. Survey, Ottawa, Ont., Canada. 1909.
Taylor, E. F., Grass Valley, Nevada Co. 1910.
Taylor, Mrs. H. J., 1711 Douglas St., Sioux City, Iowa. 1920.
Taylor, Jesse H., 210 Myrtle Ave., Eagle Rock. 1919.
Taylor, L. E., R.D. 2, Reno, Nev. 1897.
Taylor, Lionel V., Kelowna, B. C., Canada. 1921.
Taylor, Dr. Walter P., Biol. Sta., La Jolla. 1905.
Teachenor, Dix., 510 Rialto Bldg., Kansas City, Mo. 1922.
Tenney, Vernon L., 2536 Etna St., Berkeley. 1922.
Terrill, L. McI., 44 Stanley Ave., St. Lambert, Que., Canada. 1911.
Terry, Mrs. Anne B., 1976 N. Berendo St., Hollywood. 1920.
Test, Dr. Louis A., 222 North St., W. Lafayette, Ind. 1908.
*§Thayer, John E., Box 98, Lancaster, Mass. 1906 (1914).
Thomas, Geo. C. 3rd, 1014 Crescent Drive, Beverly Hills. 1922.
Thompson, Mrs. H. F., 817 S. Spring St., Los Angeles. 1922.
Thompson, J. Walcott, 527 E. 1st S. St., Salt Lake City, Utah. 1918.
Thomson, Miss Isabel A., 5939 Shafter Ave., Oakland. 1918.
Thowless, Herbert L., 255 Fourth St., Newark, N. J. 1919.
Tindall, Charles W., 912 N. Noland St., Independence, Mo. 1920.
Todd, W. E. Clyde, Carnegie Museum, Pittsburg, Pa. 1909.
Tonkin, George, Biol. Survey, Baker, Ore 1920.
Torrey, Frederic C., 1 Canyon Road, Berkeley. 1921.
Treganza, A. O., 522 S. 13th St. E., Salt Lake City, Utah. 1907.
Treganza, Mrs. A. O., 522 S. 13th St. E., Salt Lake City, Utah. 1915.
Trenor, T., Box 2, Sta C., Los Angeles. 1913.
Trescot, E. B., R.D. 4, Box 221, Petaluma. 1915.
Trippe, Thomas M., Howardsville, Colo. 1911.
Trumbull, J. H., 39 Farmington Ave., Plainville, Conn. 1911.
*Tyler, John G., P. O. Box 173, Fresno. 1905 (1920).
Tyler, Dr. Winsor M., 522 Massachusetts Ave., Lexington, Mass. 1914.
Ufford. Elmer, Box 92, Dresden, Kan. 1917.
Unglish, W. E., Gilroy. 1910.
Van Cleve, H. R., 539 Mer. Nat. Bank Bldg., Los Angeles. 1922.
Van Denburgh, Dr. John, 240 Stockton St., San Francisco. 1916.
Van Dyke, Mary Ames, 1545 Le Roy Ave., Berkeley. 1920.
Van Fleet, Clark C., Box 468, Santa Rosa, 1906.
Van Gaasbeek, Miss Florence M., 2523 Hillegass Ave., Berkeley. 1921.

§Van Rossem, Adriaan, 3459 S. Arlington St., Los Angeles. 1909.
*Van Straaten, H., Het Veldhuis, 8 Dennersweg, Velp, Holland. 1918 (1919).
Vorhies, Chas. T., Univ. Ariz., Tucson, Ariz. 1916.
Wachtel, Elmer, Box 103A, 1155 Linda St., Pasadena. 1922.
Wade, Otis H., 1353 Vine St., Hollywood. 1921.
Wagner, Edward H., 527 San Joaquin St., Stockton. 1922.
Walker, Alex., Blaine, Ore. 1911.
Walker, Ernest P., Biol. Survey, Juneau, Alaska. 1910.
Wanzer, James Olin, Cal. Highway Comm., Div. 3, Sacramento. 1921.
Warburton, Stanton, Jr., 311 Fidelity Bldg., Tacoma, Wash. 1917.
Ward, F. H., 18 Grove Place, Rochester, N. Y. 1915.
Warmer, Charles A., 1310 Baker-Detwiler Bldg., Los Angeles. 1920.
Warmer, Mrs. Edna R., 2549 Beechwood Drive, Los Angeles. 1921.
Warren, E. R., 1511 Wood Ave., Colorado Springs, Colo. 1909.
Waterhouse, John Thomas, care Alexander and Baldwin, Ltd., Honolulu, T. H. 1921.
Wear, Miss Winifred N., 253 Coast Ave., Fresno. 1909.
Weber, J. A., Moore and Grand Aves., Leonia, N. J. 1915.
Wegeforth, Dr. Harry M., 210 Maple St., San Diego. 1920.
Weiser, Charles S., 105 W. Springettsbury Ave., York, Penn. 1920.
Welch, L. W., 1845 Olive Ave., Long Beach. 1911.
Welsh, Joseph, Pasadena Hdw. Co., Pasadena. 1917.
Wetmore, Dr. Alexander, Biol. Survey, Washington, D. C. 1909.
Whalen, Mrs. Etta L., Box 128, Williams, Minn. 1914.
Wheeler, Mrs. J. W., 403 15th Ave. N., Seattle, Wash. 1912.
Wheeler, Roswell S., 1221 Boston St., Altadena. 1894.
White, Halsted G., 1437A Walnut St., Berkeley. 1914.
Whitney, Miss Margaret W., 1563 N. Raymond Ave., Pasadena. 1919.
Whittle, Charles L., 50 Congress St., Boston, Mass. 1922.
Widmann, O., 5105 Enright Ave., St. Louis, Mo. 1904.
Wilcox, Mrs. Lydia, 10 Latona St., San Francisco. 1921.
Wilder, H. E., Carlotta, Humboldt Co. 1909.
Willard, B. G., 51 Fresh Pond Parkway, Cambridge, Mass. 1910.
Willard, F. C., Farmingdale, Long Island, N. Y. 1905.
Willett, Geo., Craig, Alaska. 1905.
Williams, John, R.D. 9, Iowa City, Iowa. 1918.
Williams, R. F., 218 Inwood Ave., Upper Montclair, N. J. 1919.
Williams, Ralph B.,San Ysidro Ranch, Santa Barbara. 1922.
Williams, Robert W., Tallahassee, Fla. 1914.
Wilson, Rev. Francis M., Beaumont. 1921.
Wilson, J. Frank, 512 E. Lemon St., Monrovia. 1915.
Winson, J. W., Huntingdon, B. C., Canada. 1921.
Wolfe, Lieut. L. R., 64th U. S. Inf., Plattsburg Barracks, N. Y. 1921.
Wonser, Mrs. Katherine A., 4102 Brooklyn Ave., Seattle, Wash. 1920.
Wood, Dr. Casey A., 7 West Madison St., Chicago, Ill. 1916.
Wood, Dale T., 1470 E. Wilson Ave., Glendale. 1921.
Wood, Jesse J., 330 W. Micheltoreno St., Santa Barbara. 1912.
Wood, Mrs. Mildred Tiffany, Hopland. 1921.
Wood, Norman A., Museum Zool., Ann Arbor, Mich. 1916.
Woodruff, Frank M., Chicago Acad. Sciences, Chicago, Ill. 1906.
Woodruff, Regina, Zool. Dept., Univ. Calif., Berkeley. 1920.
Woods, Robert S., 919 S. Bonnie Brae, Los Angeles. 1920.
Woodward, C. H., 4129 Ingalls St., San Diego. 1920.
Wright, Curtis, 81 Hillcrest, Berkeley. 1916.
§Wright, Frank S., 14 Cayuga St., Auburn, N. Y. 1910.
Wright, Howard W., 830 N. Orange Grove Ave., Pasadena. 1921.
Wueste, Rudolph, Lower Otay Dam, Bonita. 1901.
*Wyman, L. E., Museum Hist., Sci., and Art, Los Angeles. 1908 (1920).
Wythe, Margaret W., Museum Vert. Zool., Berkeley. 1912.
Young, Pauline Rodgers, Canille, Santa Cruz Co., Ariz. 1918.
Zahn, Otto J., 2115 Estrella Ave., Los Angeles. 1896.
Zech, Miss Lillian, 335 W. Highland Ave., Redlands. 1916.
Zerlang, John, Rolph, Humboldt Co. 1918.
Zerlang, Lawrence, 524 W. Hawthorne St., Eureka. 1918.
Zinn, Zola, 4002 39th St. S. W., Seattle, Wash. 1921.

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